The RUBBER AGE

July, 1942

KALVAN

A WHITE PIGMENT

ONE HUNDRED PER CENT INCREASED PRODUCTION NOW AVAILABLE

Heavy loading, like soft-blacks, permits a good saving of rubber and reclaim

ALSO KALVAN "S"

especially for use in synthetics

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Newsletter No. 7 *PUBLISHED BY RUBBER CHEMICALS DIVISION OF* DU PONT *JULY, 1942*

Protection of Rubber Products Against Sunlight and Oxidation is Vital

ONE OF THE WORST ENEMIES of rubber products is the actinic rays of a scorching summer sun. Rubber parts must be made to have the longest possible life under all types of service conditions, and, under present conditions, even the best sunlight protection is barely good enough. Where exposure to sunlight is concerned, protection can only be afforded by covering the exposed surfaces with a *continuous* protective film capable of filtering out the harmful actinic rays. The most practical method of achieving this desirable result is to incorporate Heliozone into the unvulcanized stock.

HELIOZONE is a mixture of specially selected waxy materials having a specific gravity of 0.90. It melts at normal processing temperatures and thus disperses easily when added at any time during the mixing operation. Resistance to sun-checking is afforded by Heliozone because it blooms to the surface of the rubber product after curing, to form a smooth, continuous, plastic film which cannot be scraped off. The protective film is invisible to the eye. Because of the unusual properties of the special waxes used in the manufacture of Heliozone, it is effective under all weather conditions. The film does not melt or dissolve in the rubber at hot summer temperatures; and it retains its flexibility and elasticity even at cold winter temperatures.

In stocks containing large proportions of reclaimed rubber, Heliozone has the added value of improving appearance.

Since Heliozone functions by blooming to the surface, the amount required to provide protection depends on its solubility in the compound at the temperature of service. A good rule for determining the amount of Heliozone required is to use one volume per 100 volumes of rubber and two volumes per 100 volumes of compounding ingredients present in the compound.

OXIDATION RESISTANCE—Although an excellent sun-checking inhibitor, Heliozone is not an antioxidant and therefore should always be used in conjunction with a good antioxidant. Where discoloration is unimportant we recommend the use of 1.0% Neozone A with Heliozone.

NEOZONE A is an all-purpose antioxidant. It is very soluble in rubber and may be used in amounts up to 5.0% without blooming. Normally 1.0% on the rubber provides excellent protection against ordinary aging conditions. Neozone A also provides protection against heat and fatigue deterioration.

COPPER IS OXIDATION CATALYST— The catalytic effect of copper on oxidation has long been known. Copper Inhibitor X-872-A reacts with copper that may be present in the rubber composition to form a harmless inert compound that no longer possesses any catalytic effect on the aging of the vulcanizate. The value of Copper Inhibitor X-872-A in counteracting copper is illustrated in the accompanying data.

Compound 400	-1975	-1976	-1977
Pale Crepe	100.	100.	100.
Zinc Oxide	100.	100.	100.
Lithopone	20.	20.	20.
Stearic Acid	1.	1.	1.
DOTG	0.75	0.75	0.75
NEOZONE D	1.	1.	1.
Copper Stearate	—	0.05*	0.05*
COPPER INHIBITOR X-872-A	—	—	1.
Sulfur	3.	3.	3.

Cure: 45 minutes at 287 °F.
*Equivalent to 0.005 part copper.

TEST DATA

Original			
Tensile Strength psi...	3600	3450	3500
Elongation at break %	660	670	650

After 7 days in oxygen at 70° C. and 300 psi pressure			
Tensile Strength psi...	2450	Deteriorated	2225
Elongation at break %	620	"	585

In order that rubber products may give the ultimate in service during this critical period, serious consideration should be given to the use of Copper Inhibitor X-872-A whenever there is a chance of traces of copper being present.

Through the Mill

MBT AND MBTS—*We are pleased to announce the addition of MBT (mercapto-benzothiazole) and MBTS (benzothiazyl-disulfide) to our line of rubber accelerators. Both are available for prompt shipment from our plant at Carney's Point, New Jersey, as well as from our branch warehouses in Akron, Ohio; Boston, Massachusetts; Chicago, Illinois; Los Angeles, California; San Francisco, California and Trenton, New Jersey. The Du Pont Rubber Laboratory and our technical representatives stand ready to assist in adapting these accelerators to your use.*

PACKAGES—*A portion of our Neoprene Type GN is now being packed in 50-lb., multiple-ply, paper bags rather than the conventional fiber drum containing 150 lbs. net. In addition to conserving materials, we believe you will find 50-lb. bags more convenient to handle in your plant. We expect in the near future to be shipping all Neoprene Type GN in this new package.*

WIRE INSULATION AND JACKETS—*Amendment No. 2 to the War Production Board's Supplementary Order M-15-B-1 restricts the volume of rubber and scrap rubber that may be used in compounds for both wire insulation and jackets. A recent informal report suggesting compounds that meet these requirements is "Wire Insulation and Jacket Stocks to Meet War Production Board Supplementary Order M-15-B-1-Rubber Amendment No. 2."*

ABRASION RESISTANCE—*Many Government specifications include the measurement of abrasion resistance by the Bureau of Standards Abrasion Machine. For those who are not equipped with this apparatus, we have prepared a brief report correlating the results obtained with the Bureau of Standards and Du Pont Abraders.*

RUBBER CHEMICALS DIVISION

Wilmington DU PONT *Delaware*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year. Canada, $3.50; Foreign, $4.00. July, 1942. Vol. 51, No. 4.

Here comes the $64 Question!

Are you ready?

What is it, that is now so new and precious, yet after the war you will wear it—walk on it—ride on it—and use it in a dozen different ways, a dozen times a day—every day of your life?

Come on now, that ought to be easy for you folks who are laying up cars, and searching for old floor mats, bathing caps, nursery nipples.

Rubber! That's right

—but it will be a synthetic rubber, made in America, by Americans, for Americans—a rubber made from ingredients produced within the boundaries of the United States. Basic domestic materials now produce Hycar synthetic rubber that will wear longer.

Right now, thousands of tons of Hycar butadiene rubber are being produced. This Hycar is being processed into literally millions of parts that go into planes, ships, jeeps, and the most vital essentials of war.

After Victory, Hycar synthetic rubbers will continue to replace tree rubber in scores of applications, to make *better* articles for industrial and domestic use, and make America a better place in which to live.

Hycar crude synthetic rubbers are furnished to manufacturers of finished rubber products. Your rubber supplier can explain the superior qualities of Hycar. If you are making a war essential, our research laboratories and engineers will gladly cooperate to speed production and determine the best type of Hycar for your particular application. Hycar Chemical Company, Akron, Ohio.

RESEARCH • ENGINEERING • PRODUCTION

HYCAR *Synthetic Rubber*

LARGEST INDEPENDENT PRODUCER IN AMERICA OF BUTADIENE SYNTHETIC RUBBER

"Better Tear and Abrasion" MEAN BETTER RUBBER FOR FIGHTERS!

C-700 Alumina is added as reinforcing pigment for rubber in a Banbury mill.

"C-700 Hydrated Aluminas, used as reinforcing pigment in our top grades of rubber, give better tear and better abrasion properties." The man speaking is chemical engineer for one of the country's largest manufacturers of footwear. Thus they're adding extra life to rubber footwear being supplied to the Army and Navy, and to our fighters on the home front. Rubber goes farther and lasts longer.

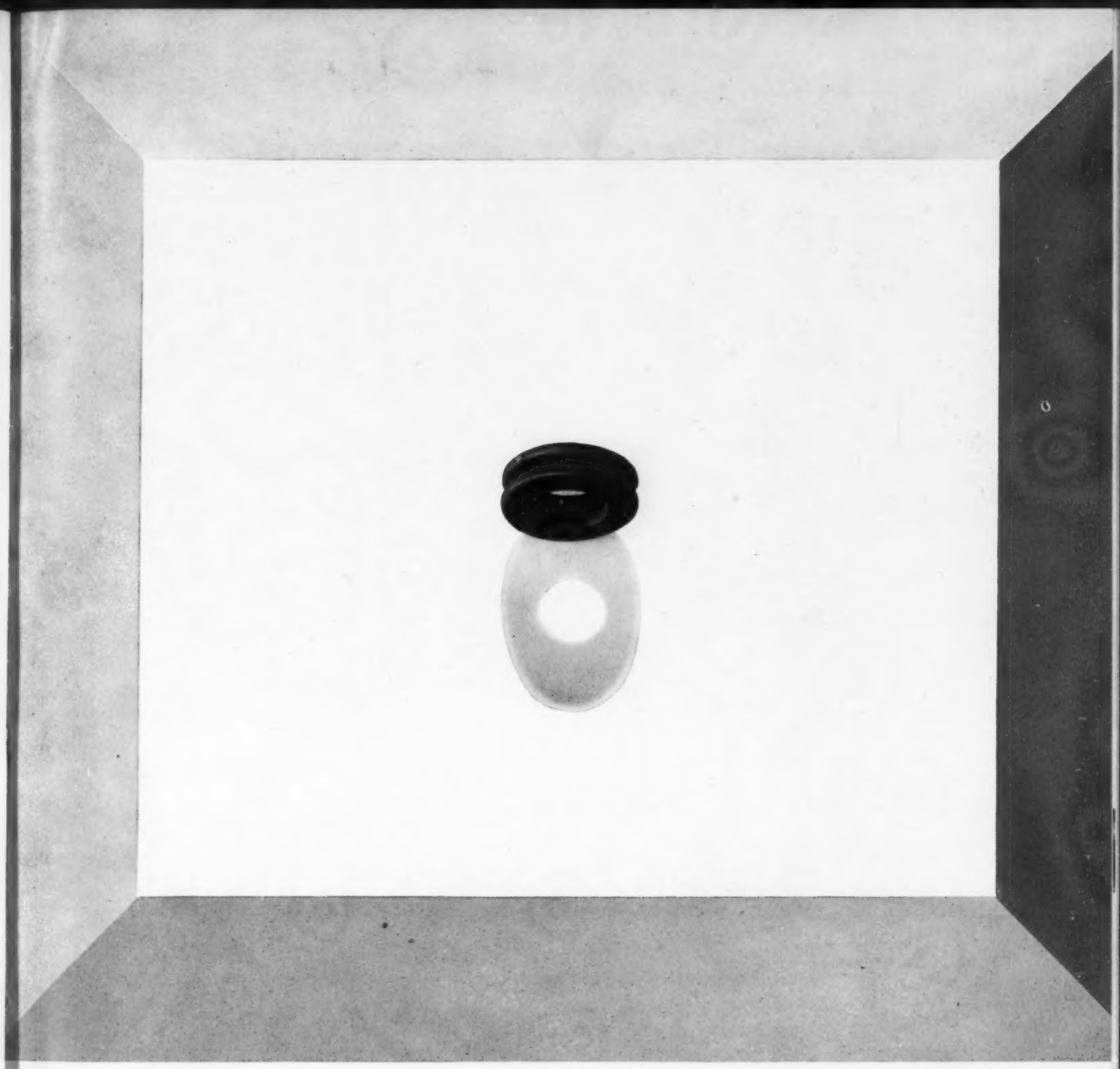
Rubber also has these desirable properties when C-700 Aluminas are used: Unusually good tackiness of uncured stock, high resilience and rubber properties with high pigment loading, low specific gravity, high modulus with high elasticity, and good dielectric properties. It has low heat build-up and good heat transfer, superior aging characteristics, and high strength at elevated temperatures.

Whatever rubber products you are making, it may pay to investigate the use of C-700 Aluminas. ALUMINUM COMPANY OF AMERICA (*Sales Agent* for ALUMINUM ORE COMPANY) 1970 Gulf Building, Pittsburgh, Pennsylvania.

Reg. U. S. ALORCO Pat. Off.

ALUMINUM ORE COMPANY

ALUMINUM AND FLUORINE COMPOUNDS



Multiply it by 100,000,000

AMERICA'S men-of-war and machines for war production are swallowing stamped and molded Thiokol* synthetic rubber parts at the rate of 100,000,000 per year. The different jobs these tremendous trifles are doing can't be counted—but their importance to victory *can!*

Often permanently immersed in gasoline, oils and greases . . . frequently exposed to burning sunlight and severe oxidation . . . millions of Thiokol* synthetic rubber parts are giving lasting service where many other materials fail. In other cases the use of Thiokol* synthetic rubber is conserving our natural rubber stockpile.

In cooperation with rubber technicians and Government authorities Thiokol Corporation is today occupying itself only with the development of uses of Thiokol* synthetic rubber directly connected with the war. Thiokol Corporation, Trenton, New Jersey.

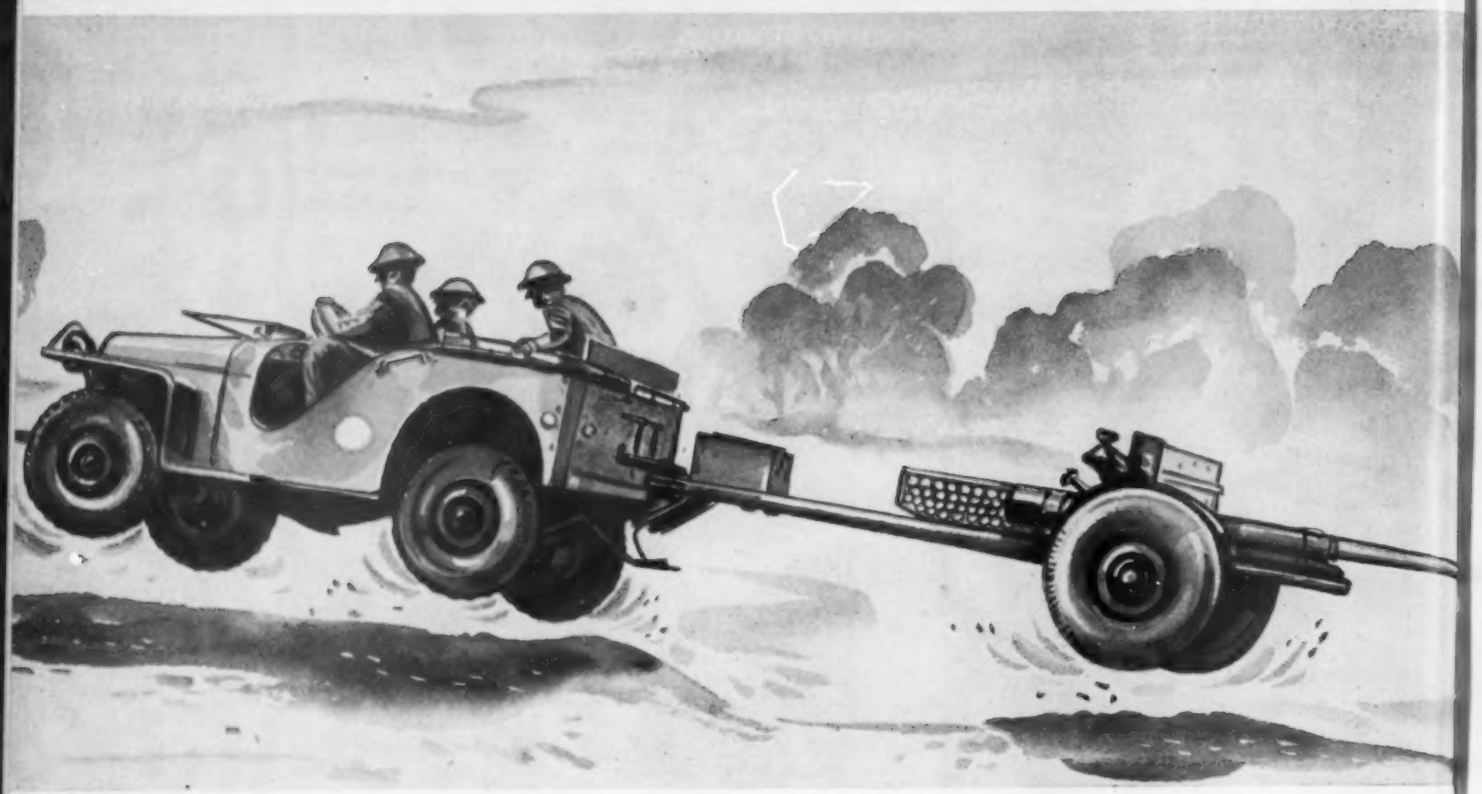
Thiokol

SYNTHETIC RUBBER

"AMERICA'S FIRST"

*Thiokol Corporation trade mark reg. U. S.

OUR ARMED FORCES ROLL ON RUBBER



KEEP YOUR PRODUCTION *Rolling*
with CLIMCO PROCESSED LINERS

★ More than ever before speed in production is essential. Today your liners must function with the greatest efficiency. You can't afford such costly delays as cutting out and repairing bad spots, rerolling for cooling, or constantly cleaning your liners between trips to the calender. Climco Processing saves this time by coating the liner with a tough, flexible glaze that insures perfect separation. ★ All the evils of stock adhesions are ended, labor and power costs drop, and the life of the liner is increased. ★ Year after year many prominent rubber companies send us repeat business. We believe their satisfaction with Climco Processing proves its value, and explains why it is worthy of a trial in your plant.

CLIMCO

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INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

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Cleveland, Ohio

CLIMCO PROCESSED LINERS
For Faster, Better Production at Lower Cost

To Waste Rubber Is An Extravagance Which We Can Ill Afford Today!

IF there ever was a time to prevent the wastage of rubber resulting from sticking of rubber to untreated liners—*it is now!* This is an economic waste which if not prevented not only results in a loss of rubber but also brings delays and waste of time, labor and materials.

To overcome this the *Capitol Process Liner Treatment* is offered you. It is an economical and efficient means of preventing the adhesion of rubber to liners —a process which is low in cost and also helps prolong the life of cotton fabrics.

Capitol Liners have proven their value in a great many plants. If you will send us a 50 or 100 yard liner, we will treat it gratis so you can test it in your own factory. You will be pleased at the all-around savings you will effect in rubber and in your annual purchases of piece goods.

★

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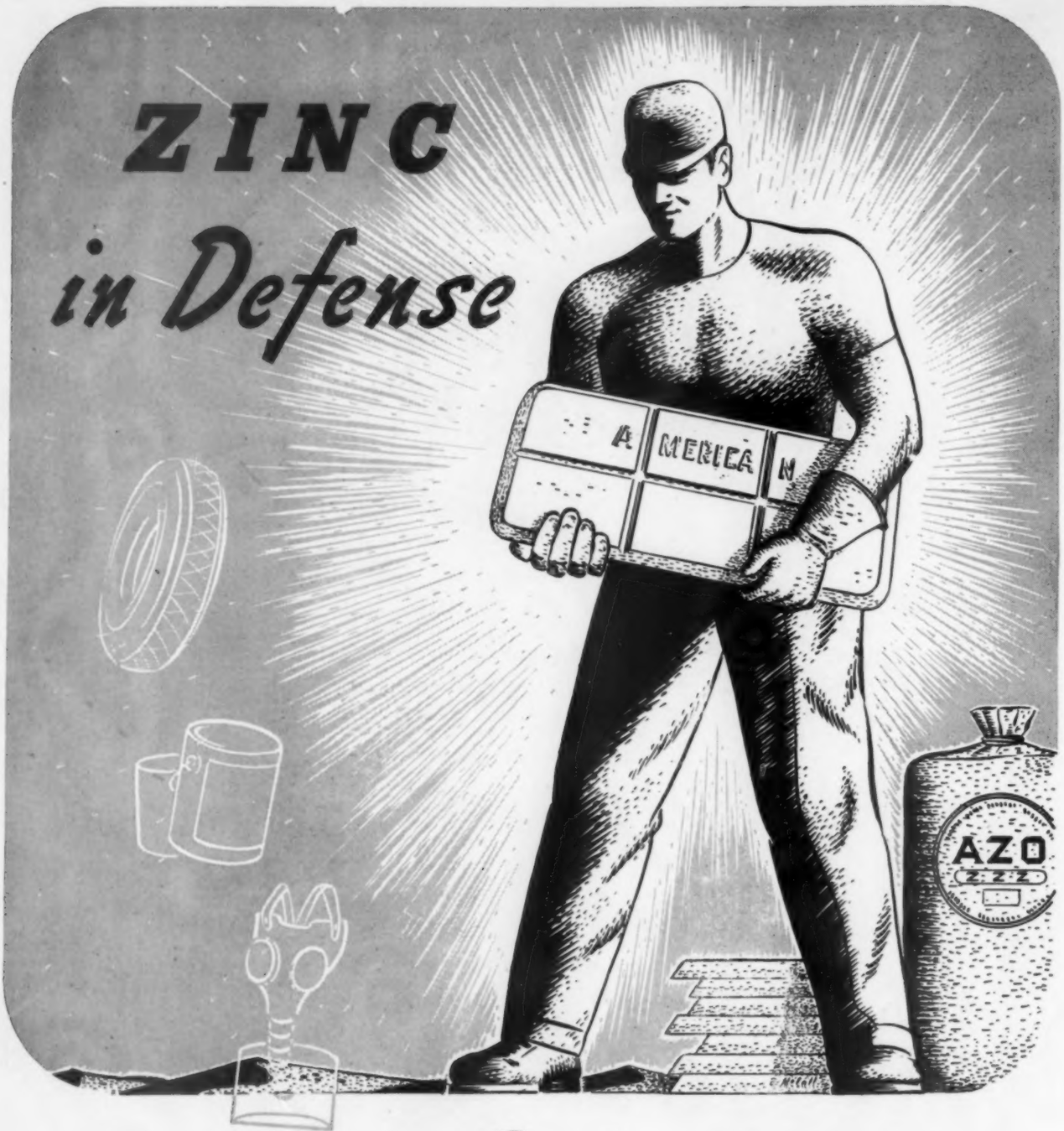

In a thousand ways zinc is vital to the nation's defense program. The brass for shells is one-third zinc. Alloyed with aluminum, zinc helps build airplanes. The zinc which covers galvanized metal equipment protects it from rust and corrosion. In sheet form zinc makes batteries and boiler plates. Zinc oxides are vital in the manufacture of rubber tires, gas masks, paint products, and many other defense items.

Though defense comes first, the American Zinc industry is employing every available facility in an "all out" effort to satisfy the unprecedented demand for every zinc product.

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Distributors for
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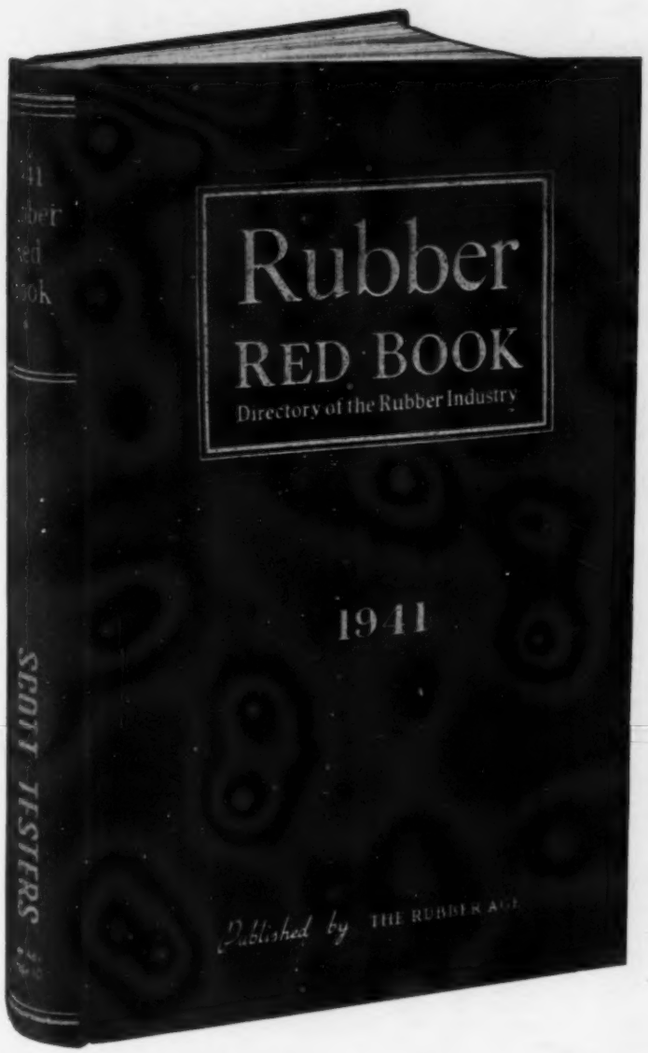

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New York, N. Y.

The INDISPENSABLE REFERENCE BOOK for Rubber Manufacturers, Suppliers, etc....

To rubber factory executives, purchasing agents, technologists, etc., the RUBBER RED BOOK furnishes complete and handy lists of suppliers of all kinds of materials, equipment and services classified for easy reference. This is a service which saves buyers much time and effort as in no other directory are such lists available.

Suppliers and their salesmen, on the other hand, find the RUBBER RED BOOK invaluable for its complete and accurate listing of rubber manufacturers in the United States and Canada with such data as size of company, type of products made, names of buyers and other executives, etc. Also included is a geographical breakdown of rubber manufacturers in the United States showing all companies in each city and town. This feature enables salesmen to be certain that no prospect is overlooked.

No matter what position you hold in the rubber industry—factory executive, purchasing agent, chemist, technologist; supplier of machinery, chemicals, rubber, or other materials; librarian; consultant; salesman or user of rubber products—you should have a personal copy of the 1941 RUBBER RED BOOK on your desk or in your brief case ready to give an immediate answer to the thousand and one questions which crop up constantly, particularly during these critical days when accurate information is so essential.

Summary of Contents 1941 RUBBER RED BOOK

RUBBER MANUFACTURERS IN THE UNITED STATES
Alphabetical Section; Classified List of Rubber Products; Geographical Section.

RUBBER MANUFACTURERS IN CANADA

RUBBER MACHINERY AND EQUIPMENT
Classified List of Machinery; Machinery Manufacturers and Addresses

ACCESSORIES AND FITTINGS
Classified Lists of Products; Suppliers and Addresses

RUBBER CHEMICALS AND COMPOUNDING MATERIALS
Classified List of Materials; Trade and Brand Names; Suppliers and Addresses

FABRICS AND TEXTILES
Classified List of Materials; Suppliers and Addresses

CRUDE RUBBER AND RELATED MATERIALS
Classified List; Suppliers and Addresses

SYNTHETIC RUBBER AND OTHER RUBBER-LIKE MATERIALS

RECLAIMED RUBBER
Manufacturers and Addresses; Methods of Manufacture; Statistics (1919-1940)

SCRAP RUBBER DEALERS

RUBBER DERIVATIVES

RUBBER LATEX
Latex and Latex Compounds; Water Dispersions; Special Latex Processes; Latex Compounding Materials; Latex Machinery and Equipment

MISCELLANEOUS PRODUCTS AND SERVICES
Backing for Camelback; Cork Products, Wax Crayons; Decalcomania Transfers; Scrap Rubber Grinding; Inks for Printing on Rubber; Rubber Labels; Master Batches; Liner Compounds; Liners Processed; Processed Liners; Processed Paper

CONSULTING TECHNOLOGISTS

MANUFACTURER'S SALES AGENTS, BRANCH OFFICES, ETC.
In the United States; In Canada

TECHNICAL JOURNALS

TRADE AND TECHNICAL ORGANIZATIONS

WHO'S WHO IN THE RUBBER INDUSTRY

SUBJECT INDEX

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..... 19.....

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To offset the extra heat generating properties of reclaim in heavy-duty tires, Continental has developed a new type black. Continental "AA" maintains just the right balance between wear resistance in the tread compound and heat generation in the tire itself.

The low heat generating characteristics of Continental "AA" are the result of special processing, and have been thoroughly tested in actual reclaim formulations. Proven superior to standard channel blacks, Continental "AA" meets a vital need for military, truck and bus tires formulated partially with reclaim that must "stand up" under the severest operating conditions and in very hot climates.

IT'S EASIER PROCESSING, TOO!

Continental "AA" is easier processing, too—another advantage over standard blacks customarily used for passenger car tires, and particularly welcome in wartime production.

To meet the demand for this type black, Continental has rearranged its production set-up and now can supply as much as may be required. The same high quality that characterizes all grades of Continental Black applies to this new low heat generating type. Send for samples—find out how completely Continental "AA" fills your needs.

TRY IT IN YOUR BUNA S FORMULATIONS

Experimenting with this type synthetic rubber? Now is an excellent time to investigate the characteristics of Continental "AA" in your Buna S formulations. Samples for this purpose are also available on request.

Continental **CARBON COMPANY**

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Cyanamid's warehouses are situated at conveniently located shipping points—to save you time and unnecessary steps in obtaining chemicals for rubber production. Note the addresses of our sales representatives below. And depend on it, Cyanamid controlled quality means time and trouble saved for you in processing, too. Get in touch with our nearest office for—

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. . . to build into our relations with our customers for Zinc Oxide the same understanding of their requirements and needs during these changing times that we build into our products. This, as well as the quality of our product, accounts for our ever increasing opportunity to serve the consumers of Zinc Oxide in America.

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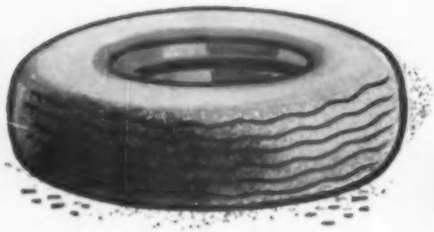
MADE BY THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES

Barrett presents a new aid to national rubber conservation

"Carbonex*S" is a coal-tar product, developed by Barrett and destined to play an important part in the conservation of America's rubber supply. This highly efficient compounding material is equally effective for use with reclaimed or crude rubber stocks. It exhibits these characteristics:



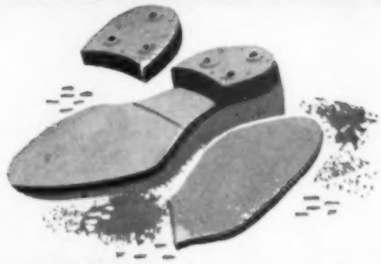
EXTENDER—5 to 10% on the rubber hydrocarbon to conserve crude rubber.

REINFORCING SOFTENER—A highly practical control of toughness.

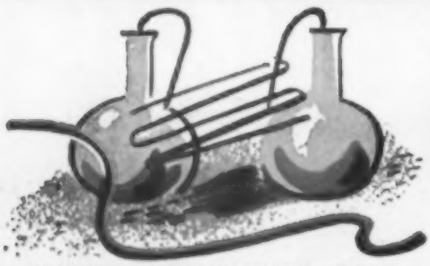
RAPID EXTRUSION—Minimizes swelling and lessens sagging and flattening.

IMPROVES TEAR RESISTANCE—An important factor to increase wear.

INCREASES RESISTANCE TO CUTTING—Service life is extended.

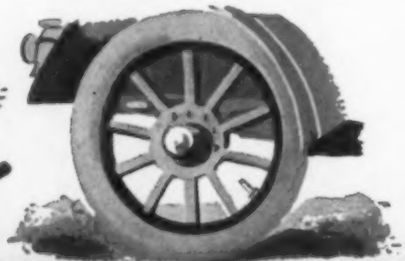


IMPROVES MOLDING—Imparts a high finish for longer wear.



PROMOTES BETTER PROCESSING—Calendering and extruding properties are greatly improved.

EXCELLENT AGING QUALITIES—A final great help in rubber conservation.



★ Skilled technicians of the Barrett rubber laboratory will be glad to cooperate with you in adapting Carbonex*S to the particular requirements of your product. Phone, wire or write today for full information.

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ALLIED CHEMICAL & DYE CORPORATION
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NOTICE—To Users Of LATEX

· NORMAL · CONCENTRATED · PROCESSED

We have stocks of normal and concentrated latex for prompt shipment against Rubber Reserve Company permits. We also process and compound such latex to meet individual requirements.

Reclaimed Rubber Dispersions

Many other substitutes are available for purposes where latex is not permissible at present.

Write us for further information.

Trade Mark

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1864 . . . Marching to the Sea

In one of the most tragic chapters of the Civil War, William T. Sherman began his advance upon Confederate territory south of the battle-front in Virginia. With his 60,000 men in four columns, living off the country and destroying railroads and public buildings along a swath 60 miles wide, Sherman reached the seacoast more than a month later.

IN the years that followed, America was re-united and the smoke of industrial stacks wrote the story of a new march — this time one of constructive forces.

Likewise, it was a high ideal that led the way to brilliant success in the manufacture of Carbon Blacks.

And today, Atlantic Carbon Blacks serve all America by meeting the highest standards of many of the greatest firms in the rubber industry during another period of national emergency.

ATLANTIC CARBON BLACK

MANUFACTURED BY

CHARLES ENEU JOHNSON AND COMPANY

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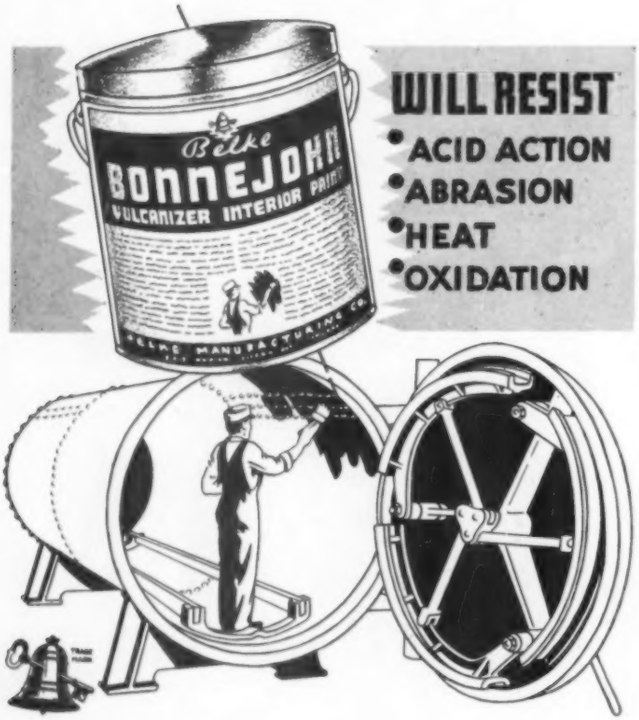
The Sensational New

VULCANIZER INTERIOR PAINT



WILL RESIST
- ACID ACTION
- ABRASION
- HEAT
- OXIDATION

SAVE YOUR VULCANIZERS with *Bonnejohn Vulcanizer Interior Paint* an insoluble coating that gives lasting protection to fittings and vulcanizer interior surfaces.

Its formula represents the results of scientific experiments and contains materials that minimize sulphurous fumes and acid action as well as being anti-corrosive under high steam pressure.

Can be applied with a brush, spreads easily, has exceptional long lasting and adhesive qualities, seals perfectly requiring no preliminary preparation other than having surfaces clean before painting.

Recommended for carts, hangers, and door mechanism or any equipment used in the interior of vulcanizers, or any place in your plant where equipment needs protection against extreme corrosion.

Comes in black only .....$9.75 per gallon.

BELKE MANUFACTURING CO.
947 N. CICERO AVE. CHICAGO

BAIRD

MANUFACTURERS' CRUDE RUBBER PURCHASE PERMITS

▲

• Our long experience since 1903, together with our friendly relations with our old and new customers ideally equips us for the prompt, efficient and thoroughly satisfactory handling of

Manufacturers' Crude Rubber Purchase Permits

• We shall continue to appreciate and respect the business of our old friends and assure the new ones that their orders will be handled with courtesy and efficiency . . . . . .

▲

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- **LOW COST**
- **LOW TEMPERATURE FLEXIBILITY**
- **LESS INCORPORATING TIME**
- **UNLIMITED AVAILABILITY**

Write or wire today for complete data and sample.

PICCOCIZER "30"

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Chemical Company

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LATEX & Its Industrial Applications (Vol. I)
LATEX & RUBBER DERIVATIVES (Vols. II & III)
& Their Industrial Applications.

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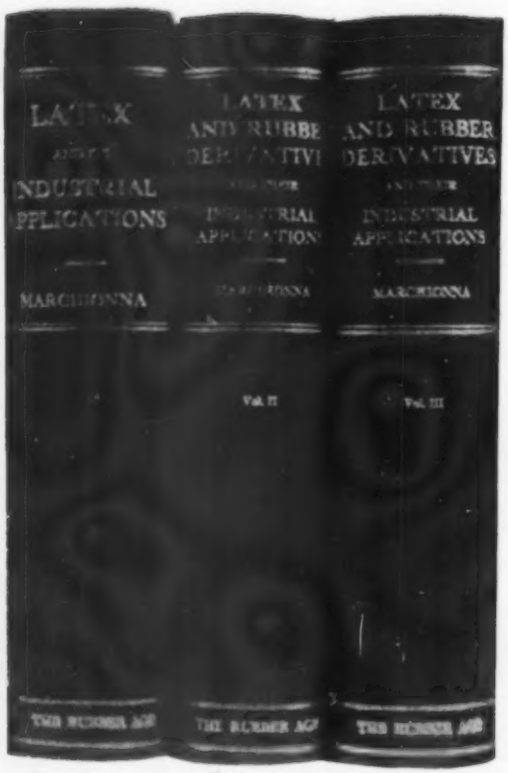
By FREDERICK MARCHIONNA



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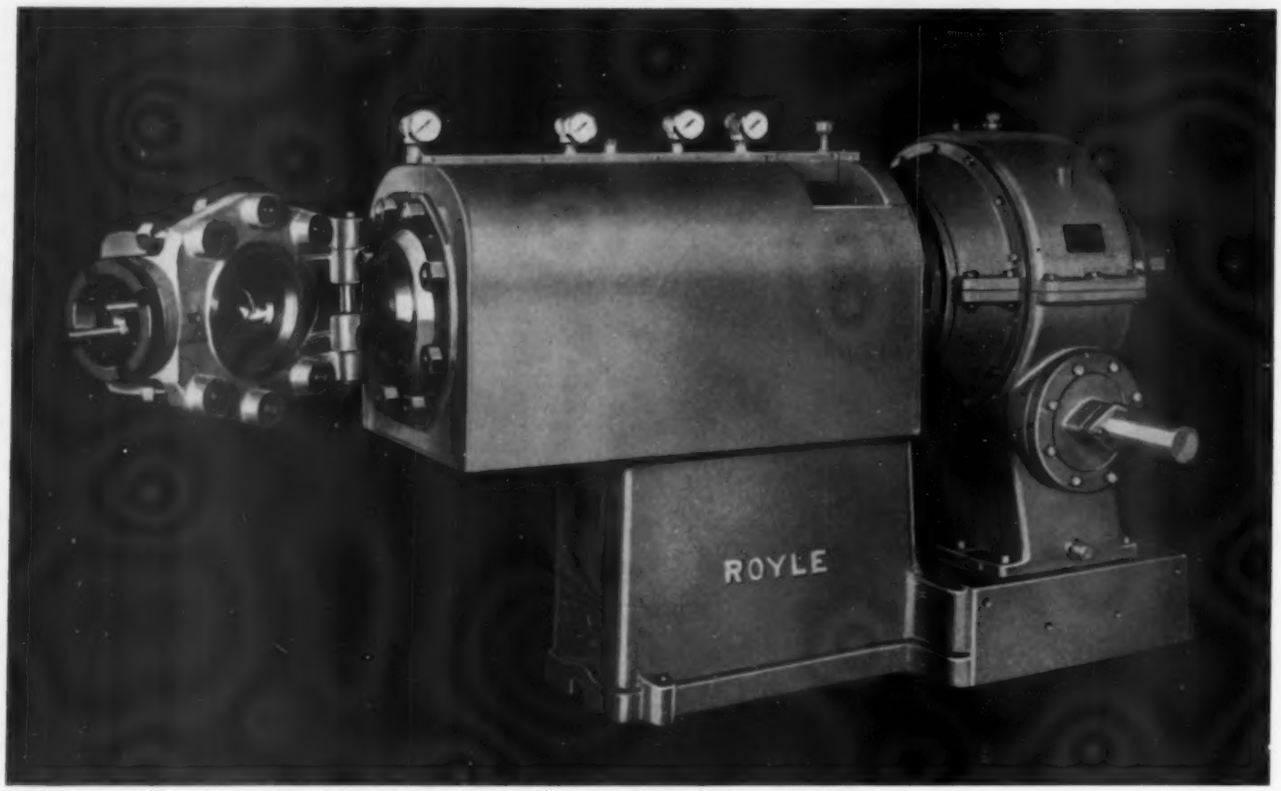

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VOL. 51, No. 4 JULY, 1942

Critical Examination of Some Concepts in Rubber Chemistry

By THOMAS MIDGLEY, JR.

Midgley Foundation, Ohio State University, Columbus, Ohio

The Willard Gibbs Medal, founded by William A. Converse, was presented to Dr. Thomas Midgley, Jr., vice-president of the Ethyl Gasoline Corporation, on May 22, 1942, at the Stevens Hotel in Chicago. Dr. Midgley was cited for his discovery of tetraethyllead as an antiknock agent in motor fuels, for his development of safe refrigerants, and for his contribution to synthetic rubber research. In his address following acceptance of the medal, Dr. Midgley criticized the rubber industry severely for neither having refuted nor accepted some of his findings and those of his associates as related to rubber technology. Believing that this accusation will prove especially interesting to rubber chemists in general, we are reproducing his full address, as it appeared in the July, 1942, issue of "Industrial and Engineering Chemistry," herewith.—Editor.

THE names of the past recipients of this medal represent a group of chemists who have added much to the science of chemistry, whereas I have added but very little. Indeed I was hard pressed to find a suitable subject for my address. Obviously, it would be out of place for me to tell you how many horsepower have been added to civilization (and the forces of decivilization) by the use of tetraethyllead or how many Pullman cars have been made inhabitable by dichlorodifluoromethane. These deletions left very little of my life that I cared to talk about. But in that little there was one piece of scientific work which seemed appropriate for the present time, since you can't get the substance any more. I refer to rubber. Perhaps I consider the work done on rubber as scientific because nothing commercial ever came of it, or it may be that it is scientific because of the part contributed by my associates, Albert L. Henne, Alvin F. Shepard, and Mary Renoll. Yet I do not feel satisfied merely to review these data, and so to emphasize the scientific importance of this work, I am going to criticize rubber technology for neither having refuted nor accepted some of these findings, and point out what I consider to be its mental slothfulness in preferring to use easy thoughts and techniques to mastering difficult ones.

Problems of Rubber Chemistry

Natural rubber is a vegetal product. It is much more common than one would suppose during these days of shortage. Indeed, it is probable that more rubber grows annually within the United States than could possibly be consumed, if we only knew some prac-

tical way of separating it from other vegetal matter. It is the ease with which it can be separated from the hevea tree by cheap labor that has confined its production to the tropics. This separation is, however, still incomplete and if we examine the purest natural product obtainable, we find that it can be roughly divided into four principal components as follows:

Component	Approx. Per Cent	Approx. Compn.
Sol rubber	70	$(C_5H_8)_n$
Gel rubber	20	$(C_5H_8)_n$
Resin	5	Various organic compounds
Protein	5	Sulfur-free protein

Both sol and gel rubbers seem to be chemical identities, as far as has been determined by chemical analysis, but the difference in physical properties contradicts such a conclusion. Sol rubber disperses completely in benzene and similar solvents, gel rubber merely swells; sol rubber vulcanizes to a useful product, gel rubber to a leathery inelastic product that is useless. Gel rubber, however, breaks down by mastication to give a material quite like sol rubber, the vulcanizate of which is, in all known respects, the same as that obtained from sol.

It was our viewpoint, in approaching the problems of rubber chemistry, that sol rubber, and sol rubber alone, was the only true rubber produced in nature and that its study alone could yield a real picture of the chemistry of natural rubber. I do not mean to imply that the study of gel rubber is not important. It is just as important to rubber technology as is the study of sol. But to fail to differentiate between the two is certain to lead to confusion. In my opinion, much of the confusion which has existed and still exists in rubber chemistry is due to the lack of appreciation of this simple fact by many rubber chemists and technologists.

A good way to develop the fundamental problems that face rubber chemistry is to start with the formula $(C_5H_8)_n$. First, we may inquire if this formula is correct. For all practical purposes of rubber technology it is; yet there is reasonable doubt as to its absolute correctness. Our own determinations *(20)* indicate that there may be one extra hydrogen for each seventy C_5H_8 units, and that an OH group is involved. These findings have not been confirmed and seem to have no particular significance, but if they should happen to be correct, then the formula becomes $\{[(C_5H_8)_{140}]H_2\}_mOH$. However, since any such formula is without confirmation, I prefer to use the simpler form, keeping in mind that it may be subject to change by the development of further data. Referring, then, to the formula $(C_5H_8)_n$ the following questions arise: Is n a constant or a variable; in other words, are all of the molecules of a sol rubber occurring in nature the same size, or is sol rubber a mixture of molecules of different sizes? If n is constant, what is its value? What is the structural formula? If an open chain, what are the end groups? In addition to these questions, the following are of technical interest. What happens when rubber is broken down? What happens in vulcanization? Why does rubber retract after being stretched? There are many more problems, but they are outside of my own sphere of activity.

Fractionation

Before reviewing the above problems, I wish to digress and discuss the techniques of separating crude rubber into its components. The resin may be removed completely and without other constituents by simple extraction with acetone. The protein can be obtained by removing the sol rubber and then breaking down the residual gel rubber and absorbing by suitable solvents. Gel rubber has not been obtained pure in its original state by any known method. The separation of pure sol rubber is controversial. Permit me to present what I consider to be the facts.

It has been known for a long time that when crude rubber is allowed to stand in various semisolvents, such as ether or paraffin hydrocarbons *(3)*, part of the crude rubber diffuses into the solvent and part remains as a jelly. There is little doubt that the fraction in solution in the solvent is richer in sol than was the original crude, but there is no convincing evidence that this process has ever been made to yield pure sol, no matter what the solvent used nor how many precautions have been taken. If gel rubber corresponded to sand, sol rubber to sugar, and the solvent to water, then an accurate separation could be made. But in all probability sol and gel rubbers are miscible and, instead of the sugar and sand analogy, the true picture is a three-component two-phase system in which all three components occur in both phases, though in different proportions. Thus it can be seen that the diffusion method of preparing pure sol rubber might require many repetitions before a suitably pure sample of sol rubber could be obtained for accurate scientific study.

In view of the time required (several days) for each diffusion fractionation and the difficulty of preventing breakdown due to the long total time required, we developed a more rapid method of fractionation *(13)*. The essential steps are: (*a*) A viscous solution of crude rubber in benzene is prepared in the absence of oxygen and gently warmed to about 50°C. (*b*) A hot mixture of absolute alcohol and benzene is slowly added with stirring. The viscosity decreases and as the addition continues, coagulation occurs at the point of mixing. These coagulated particles disperse in the main body of the liquid for a while but eventually refuse to do so; at about that time the whole mass of liquid appears turbid. This signifies that the proper amount of alcohol has been added. (*c*) The mixture is slightly heated until the turbidity disappears. (There will be a few incidental particles left which may be disregarded.) (*d*) The mixture is slowly cooled to about 1° C. below the point at which turbidity reappears. A flocculent precipitate forms and is allowed to settle as a gel while the temperature is held constant. (*e*) The supernatant liquid is decanted and its rubber content coagulated by chilling. (*f*) The coagulated rubber is removed and set aside, the liquid is again warmed, and the gel fraction from step (*d*) is dispersed in it by stirring. Steps *d* and *e* are repeated, and a second fraction is obtained. This process is repeated until the gel fraction will no longer disperse. This final residue may be Soxhlet-extracted with benzene and an additional small fraction of sol rubber removed (the amount is not worth while); an insoluble, tough material remains which must be regarded as gel rubber containing the protein as an impurity and possibly some sol rubber which cannot be further separated by extraction. This is as pure gel rubber as has ever been obtained.

The description of this process is complex. In practice it is easy and rapid. It is regrettable that the seem-

ing complexity of this method has deterred its general adoption for securing sol rubber despite the obviously better quality of the resulting product, which was demonstrated as follows:

Two identical samples of crude rubber were fractionated (*12*) by (*A*) the diffusion method and (*B*) the mixed solvent method. All precautions against breakdown were observed in both cases. The sol fractions from *A* were then fractionated by method *B*, and the sol fractions from *B* by method *A*. No further separation of the fractions obtained by the mixed solvent method was obtained by diffusion in ether, whereas the fractions originally obtained by diffusion were easily separated, by the mixed solvent method, into sol and gel constituents with such a large gel component that it is indeed doubtful if any appreciable separation of sol and gel actually had been accomplished by the diffusion method.

Breakdown

The detailed chemical reactions involved in the breakdown of rubber are not at all understood, yet the conditions which produce breakdown and the results have been studied by many investigators with fair agreement.

When rubber is masticated in the presence of oxygen, the rubber rapidly loses its strength and elasticity, and becomes quite plastic and doughlike in physical properties. The absence of oxygen inhibits this change. Elevated temperatures slow it down and lowered temperature accelerates it. A sufficient continuation of this process yields a product which is little more than a thick paste. Similar results can be obtained by exposing a solution of rubber to sunlight in the presence of oxygen.

Several simultaneous changes occur in the rubber during the breakdown process. Prominent among these (*25*) are: a decrease of molecular weight as indicated by the fact that, while unbroken-down rubber will not depress the freezing point of benzene in which it is dissolved, substantially broken-down rubber will, and the depression becomes greater, the more the rubber is broken down; a marked decrease in the viscosity of rubber solutions as breakdown continues; an increase in solubility as the rubber is broken down; and an increase of the combined oxygen (Tables I and II).

Table I. Analysis of Rubber by Combustion[a]

	H, %	C, %	H/C
Calcd. for $(C_5H_8)_n$, %	11.84	88.16	0.13436
Synthetic rubber, found	11.82, 11.83, 11.83	88.17, 88.17, 88.17	0.1342
Natural rubber, found	11.86, 11.86	88.07, 88.07	0.1346

[a] Basis of calculation: C = 12.0048, H = 1.0081, O = 16.0000; the samples of natural rubber contained 0.007% N.

Although the above throws no light on the detailed chemistry involved, it does seem conclusive that the breakdown of rubber is the result of oxidation which is accelerated by mastication and sunlight. This viewpoint is further substantiated by Busse's observation (*2*) that freshly milled rubber contains a peroxide which disappears in a few days. We undertook the investigation of the course of the oxidation but obtained only superficial results, owing to our inability to control the variables with sufficient accuracy to obtain reproducible results (*20*). This suggests the formation of highly unstable intermediate compounds. Better luck to the next investigator.

Referring to the properties of rubber which vary coincidentally in the breakdown of rubber, it would seem a fair assumption that the quantitative measurement of any one will serve as an index for the other three. Viscosity measurements have been used for this purpose (*4*). We decided to use solubilities (*14*). It would have been better had we reported our finds in viscosities from the standpoint of conventionality, and it was a definite omission on our part not to have developed the relation between the two, but this does not detract from the fundamental value of the work.

Our method of measuring solubility was to prepare a standard solution of a sample of rubber in a definite mixture of benzene and absolute alcohol and to determine at what temperature precipitation took place. The measurement was reported in terms of temperature. This method is simple and accurate.

Figure 1 shows the results of a fractionation of brokendown rubber (*15*). The vertical axis represents

Table II. Analyses of Natural[a] (Sol) and Synthetic Rubbers

Material	Ash, %	C, %	H, %	H/C	Oxygen Content Measured by: Combustion	Oxygen Content Measured by: Active H	Mol. Wt. Cryoscopy
			Natural (Sol) Rubber				
Original	0.01	88.07	11.86	0.1346	0.06	0.028	∞
Milled 1.5 hours	0.065	87.71	11.79	0.1344	0.44	0.095	∞
Degraded 1 day	0.02	87.58	11.75	0.1342	0.65	0.16	∞
Degraded 7 days	0.02	82.45	11.05	0.1340	6.48	1.51	4400
			Synthetic Rubber				
Original	0.00	88.17	11.83	0.1342	0.00	0.00	∞
Degraded 1 day	0.01	88.14	11.83	0.1342	0.02	0.00	∞
Degraded 11 days	0.01	85.43	11.47	0.1343	3.09	0.91	∞
Degraded 18 days	0.03	84.73	11.34	0.1338	3.90	1.49	8100
Degraded 31 days	0.00	79.40	10.60	0.1335	10.00	2.88	4300

[a] Nitrogen content, 0.007%.

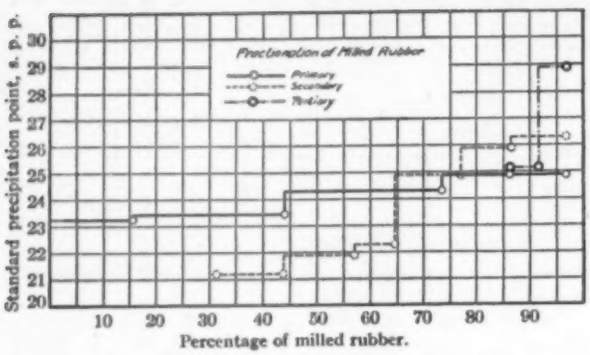


FIGURE 1. RESULTS OF FRACTIONATING BROKEN-DOWN RUBBER

the temperatures at which precipitation of the various fractions took place. The horizontal axis represents the fractions. It is obvious from these results that brokendown rubber is a mixture of rubber molecules of various molecular weights and that breakdown is not a regulated stepwise process such as would occur if there were regular weak places in the molecule, but is a heterogeneous affair such as would occur by the accidental attack of oxygen at whatever point in the molecule it happened to contact.

From what has been said, it should be obvious that breakdown must be carefully avoided both in the sample selected and in the technique used, if accurate results in rubber research are to be expected. This means that the rubber used should never have been milled, and all contact with oxygen and exposure to light must be held to a minimum during the investigation. We have found that rubber taken from the inside of L. S. "biscuits" is satisfactory as a starting material.

Is *n* Constant or Average?

If facts were determinable by popular vote, average would win by a large margin. All investigators of this problem (*3, 5, 26, 28, 29*) except ourselves, have arrived at the conclusion that sol rubber is a mixture of molecules of different molecular weights. However, if one accepts the findings already presented in this paper and then examines this work critically but fairly, he will come to the conclusion that in no case have samples of pure sol rubber been used, that in many instances rubber has been used with an indeterminate history that included some breakdown. Under such conditions the samples investigated always contained molecules of at least two sizes and usually more. Obviously the results were certain to indicate a mixture of molecules of different sizes, but the deduction that unbroken-down pure sol rubber consists of such a mixture is out of order.

When we undertook this work (*14*), we had not yet become aware of the need for selecting a sample which had never been subjected to breakdown. We chose a sample of first latex, pale crepe. Fortunately the amount of breakdown that had occurred during the sheeting of this rubber was so small that it could be identified as an impurity. It was this discovery that determined us to use only L. S. rubber for further work.

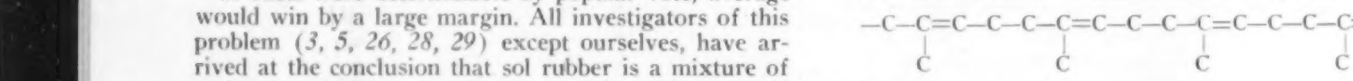
The results are reported in Figure 2, which is the conventional arrangement for distillation curves. The data were obtained by fractionating a sample of pale crepe by the method previously described; the sol fractions were then refractioned twice. Except for some early fractions which contained brokendown rubber probably incidental to sheeting, and our own manipulation imperfections, it is obvious that sol rubber consists of one single component. A comparison of Figure 2 with Figure 1, which represents a mixture of molecular sizes, provides further confirmation. Is it logical to place any other interpretation upon these data than that unbroken-down sol rubber consists of molecules of one size only? This is in keeping with many other observations of the constitution of natural products.

Value of *n* or Molecular Weight

A review of the literature reveals many attempts to determine the molecular weight of sol rubber by various methods. No two methods have given results that are in agreement. The results range from 10,000 to 435,000. Combustion analysis precludes all values below 6800 (*23*) and makes it practically certain that even this figure is far below a true minimum. Staudinger (*27*) prefers 170,000, derived from viscosity considerations. We (*19*) arrived at 54,000 by a chemical method but hold no brief for this value as compared with others, provided they are above the reasonable minimum of 10,000. Imperfect samples cannot explain these discrepancies except in the cases of some of the very old small values recorded. This problem is still to be solved.

Structural Formula

In 1911 (*24*) Staudinger obtained a fifty-carbon-atom paraffin from the products of the destructive distillation of hydrogenated rubber. With this information and the known products obtained by treating rubber with ozone, he deduced and proposed that the structural formula of rubber was a long chain:



About twenty years passed before this concept superseded completely the eight-sided ring structure previously proposed by Harries (*7*). We confirmed this concept of Staudinger by identifying many of the hydrocarbons produced by the destructive distillation of rubber (*11*) and showing their relation to the long-chain structure. Today this structure is universally accepted as a basis for explaining chemical behavior of rubber.

End Groups

Some work has been done to determine the end groups of the long-chain structural formula. Nothing conclusive has been obtained. Our discovery of the evidence of the existence of an OH group (*20*), associated in some way with the rubber molecule, suggests it as such a possibility. One suggestion, often repeated, is that the long chain actually is a very large ring. No evidence, either supporting or contradicting such a concept, has been obtained.

Vulcanization

It is now over one hundred years since Goodyear discovered vulcanization. Broadly speaking, vulcanization is a process whereby a semiuseless vegetal product is converted into the most amazingly versatile raw material the world of industry has ever known. Need I recite your daily contacts with it? For example, when you take a shower bath, your faucet valve is faced with rubber, the curtain is a rubberized cloth, the mat that keeps you from slipping is rubber, and the imitation sponge you use is vulcanized rubber in still another form. And when you play, golf balls, tennis balls, footballs, and baseballs all depend on vulcanized rubber for liveliness. Notice that I didn't mention tires. They are almost too sacred to talk about these days. And yet after a century, rubber chemists are in less agreement on the nature of the chemistry of vulcanization than Goodyear's neighbors were that he was crazy. Nor has a Hall of Fame jury yet been selected with brains enough to honor Goodyear's memory as it deserves. It is all most astounding; but also is vulcanization.

If one wished to manufacture some rubber article, the first thing is to get a priority order; after that, the crude rubber may be obtained. The crude rubber is broken down on a mill to make it plastic, sulfur and other things are added, and the rubber is shaped to the desired form and held there for some time while being heated; after that the article is finished. Comparison of the crude rubber and the finished article will show that many physical properties are remarkably alike qualitatively, although enhanced quantitatively in the vulcanizate. Naturally this suggests that vulcanization is reversed breakdown; therefore if breakdown is the result of molecular ruptures, it logically follows that vulcanization must be molecular building up by polymerization or condensation. This indeed is an easy conception to visualize. It gives an explanation of the part played by sulfur—simply that the sulfur atom connects two rubber molecules by joining to each of them by primary valences. The simplicity of this broad concept has won many converts, too many, for it has one grave error. There is not one single piece of sound evidence that it is true and many that it is not. In the first place, vulcanization is not breakdown in reverse, except in a very superficial way. Incipient and then progressive vulcanizates do not show the regular steps of increasing viscosity and decreasing solubility that would be expected; nor can a vulcanizate be obtained that gives quantitative properties corresponding to those of unbroken-down rubber. At first there is a slight rise in viscosity during vulcanization and a slight decrease in solubility, then a sudden conversion to a gel type rubber. During the early stages of this gel formation the gel can be peptized by various agents *(30)*. Whoever heard of peptizing primary valences?

Consider both breakdown and vulcanization from a different point of view. Instead of assuming that unbrokendown rubber is elastic with fair tensile strength because its molecules are long, and that broken-down rubber is plastic because its molecules are short, imagine that the difference in plastic properties of unbroken and broken-down rubber is caused by a difference in the ease with which the molecules slip past one another under stress. True, this difference may be the result of different lengths of molecules, or it may be that in broken-down rubber a few small molecules act as lubricants for the larger ones just as a small amount of lubricating oil in unbroken-down rubber will give a plasticizing effect.

This concept does not require the rebuilding of large molecules out of small ones to account for the change that is called "vulcanization". Any procedure which results in reduced slipping will accomplish a change of this sort; witness the loading effect of carbon black or zinc oxide. But the reduction of slipping is not all there is to vulcanization. Were it all, then vulcanized rubber would disperse instead of merely swell in suitable solvents. Therefore we must assume the creation of intermolecular attractions of some sort during vulcanization. This, of course, can be accomplished by sulfur bridges between molecules. If this were the only possibility, the slipping concept would merely have been a mental detour which returned to the original starting point. But sulfur bridges are by no means the only way to stop slipping. We also have the possibility of creating groups on the molecule which will cause association. Call these polar groups or secondary valences or what you will, but in any case they differ distinctly from primary valences.

The question now resolves itself into differentiating between these two concepts—namely, attraction by primary valences and attraction by association forces. The following observations are pertinent. If vulcanization is stopped at a point just beyond gel formation—that is, where the vulcanizate will swell but no longer disperse in rubber solvents—then this vulcanizate can be dispersed by peptization *(30)*. It is difficult to see how this could be so if this gel were held together by primary valences; on the other hand, a gel held together by association forces would be expected to behave in

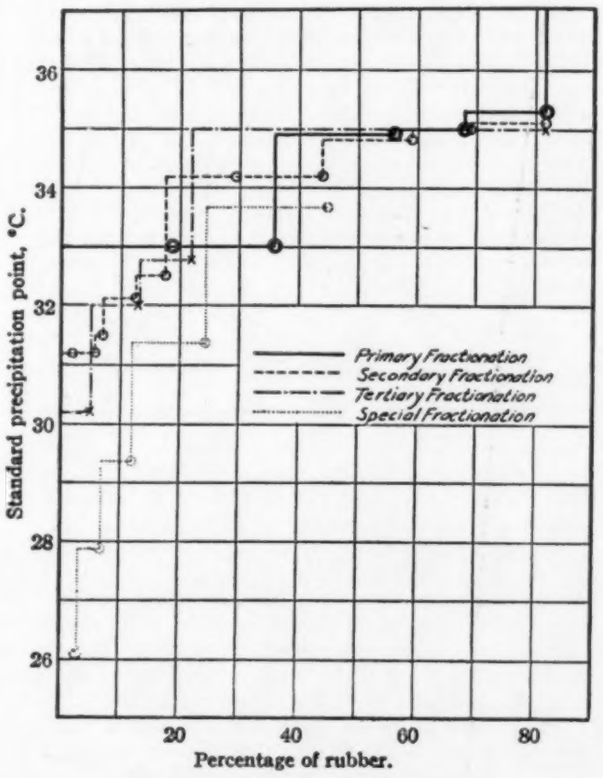
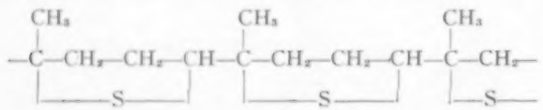


FIGURE 2. FRACTIONATION CURVES

such a manner. Again, as the amount of combined sulfur increases, a maximum point of vulcanization properties is reached after which most of these properties decrease until, at about half saturation, the vulcanizate has decreased in physical properties corresponding almost to the condition of broken-down rubber. It is difficult to see how this can be explained on the basis of primary valence formation; whereas if the forces of association are considered to be due to the formation of some kind of polar groups, the phenomenon becomes easily explainable on the basis that, as long as the polar groups of a given molecule are far enough apart, strong external forces, capable of attracting other molecules, will be in existence.

But when the number of such groups are increased and they are crowded closer together, their respective forces will be satisfied by internal attraction leaving only a small portion for attracting other molecules. This explanation admittedly is hypothetical, but it serves to demonstrate that a rational explanation of the phenomenon of overvulcanization can be based on the concept of association forces, whereas no similar explanation is forthcoming based on the primary valency concept. Even the simple observation that the slight swelling by solvents of well-vulcanized rubber greatly reduces its tensile strength also favors the association concept. For if the mass were held together by primary valences, there would seem to be no more reason for a loss of strength than occurs in a sponge when it is filled with water, while if it were held together by association forces, the adsorption of solvent would increase the distance between molecules and thus reduce the strength of the forces holding them together.

Several years ago we attempted to establish the existence of primary valence linkages between molecules by destructively distilling well-vulcanized rubber and examining the products in the hope of finding one which could be related to such a linkage. The resulting products differed in no significant detail from those obtained from the destructive distillation of crude rubber. We next extended this work to the destructive distillation of ebonite, $(C_5H_8S)_n$, without obtaining any compound suggestive of intermolecular linkage (*16*). We did obtain a group of substituted thiophenes, representing only a small part of the whole, which we interpreted (*18*) as demonstrating a linkage of sulfur to the rubber molecule:



While such negative evidence cannot be considered as disproving the possible existence of primary valence linkages between molecules, it does add to the total weight of evidence against their existence.

In contradistinction to the negative results obtained in our search for evidence to substantiate the primary valency concept, we were able to obtain positive evidence that association forces could be used exclusively for vulcanization. We discovered that the addition of Grignard reagents to rubber solutions would cause gelling. We extended this discovery to the vulcanization of a test sample of broken-down rubber (*17*). The resulting stress-strain curve is shown in Figure 3. This is a typical curve for a vulcanizate. The tensile strength is too great for a mere loading effect, and it

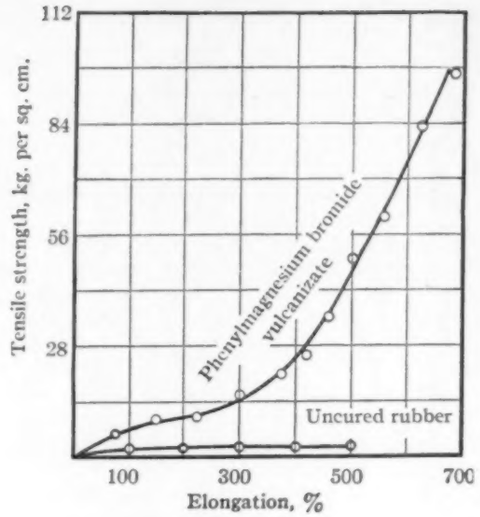


FIGURE 3. STRESS-STRAIN CURVE

is difficult to see how a small amount of methyl magnesium bromide could act as a loading agent anyway; nor is the tensile strength so very bad when it is considered that no loading agent was present. There can be no question that this result is true vulcanization. Grignard reagents do not produce intermolecular linkages; also the vulcanizate could be reverted to its original broken-down condition by counter-acting the Grignard with alcohol. The recovered product could be revulcanized with Grignard and recovered again as many times as desired, a further demonstration that intermolecular primary valences were not generated in the vulcanization.

In view of the preponderance of evidence in favor of the association concept of vulcanization and the complete lack of any basis for the primary valence concepts, it is surprising that rubber chemists continue to think in terms of primary valence as an explanation of the vulcanization reaction.

Retraction

The retraction of rubber—that is, the property which causes rubber to return to its original shape and size with force after being stretched—is the outstanding characteristic that distinguishes it from chewing gum, beeswax and tar, and makes it into the useful material it is. The study of this property really falls in the field of physics rather than chemistry, but its importance justifies its inclusion in any discussion of rubber or rubber chemistry. Indeed, this property is so important that any material which possesses it can be called a rubber, no matter what its chemical constitution (*10*).

The early students of this property took the viewpoint that rubber was analogous to gelatin in some way, that it was some sort of two-phase system (*6*), that it was a colloidal suspension (*21*), that it was corpuscular in structure (*6*), that its molecules were gathered together in miscelles (*9*), etc. None of these conceptions ever yielded constructive results or advanced rubber technology.

Some twenty-odd years ago, after Staudinger announced the long-chain structural formula, opinion began taking shape that the extension and retraction of rubber were simply an integration of the behavior of the component molecules (*1*). In other words it was assumed that the rubber molecule itself is subject to extension and exhibits forceful retraction thereafter. This concept has steadily gained ground. It is true that no direct evidence exists to confirm this concept, and by its very nature perhaps there never will be; on the other hand, no contradictory evidence exists, which very well could if this concept were in great error. Therefore, until some such evidence is obtained or a concept is developed which fits the facts more accurately, this theory should be accepted as the nearest available approach to the truth.

Under this concept a generalized theory of molecular behavior has been developed. For example, refer to Staudinger's long-chain formula above. It is obvious that this is not a true space configuration since the tetrahedral characteristics of carbon atoms are disregarded. Imagine such a space model and take into account that parts of this molecule can rotate about any single bond. Now fold the molecule back on itself many times about single bonds and a much more compact model is obtained than would appear from looking at the long-chain formula. This is a good picture of how a rubber molecule may retract, but it gives no insight into why it does so. Long paraffin molecules, such as hydrogenated rubber, could do the same thing as far as structure goes, but they do not. Rubber molecules do. Why?

Two explanations have been offered; one is by Shecklock (*22*) with later variations by others, based on thermal and thermodynamic considerations, and one is by Mack (*8*) who makes use of van der Waals forces, applied to scale models. I am incompetent to differentiate critically between these two. Each of them fits certain observed data better than the other, but Mack's concept appeals more strongly to me, as it is based more closely in the fields of rubber chemistry with which I am familiar, and it predicts quite well the behavior of rubberlike and related substances of known composition, structure, and isomerism. Its extension might be useful in predicting new molecular forms which could lead to better and less expensive synthetic rubbers than we now have.

As just stated before, I am not qualified to criticize either of the above theories, but I do feel qualified to criticize both rubber chemistry and chemists for not having mastered either of them more thoroughly. That they are difficult to master is no excuse, for the rubber chemist who expects to serve humanity well must be prepared to master many things more difficult than either of these theories.

In closing I should like to make myself clear on one point. I have not hesitated to criticize, severely, those concepts which are in disagreement with the results that I and my colleagues have obtained. I have done this in the full knowledge that I can be just as wrong as anyone else, and I shall feel grateful to anyone who proves that I have been, for then I shall profit by such proof in increasing my own understanding of these problems. Likewise I shall feel pleased if our results are confirmed, for then I shall have the satisfaction of feeling that I have aided in advancing rubber chemistry. I can be disappointed in only one way, to have our results ignored.

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Letter to the Editor

Dear Sir:

My attention has been called to the June 1942 issue of RUBBER AGE, containing an editorial on Page 219 headed "Selection of Elliot Simpson."

You quote me as saying: "Mr. Simpson has guessed so much about the rubber situation that he may hit it right with one of his guesses."

What I really stated was this: "They all seem to be guessing. Mr. Simpson's guesses will be more nearly right because he knows the rubber business."

I feel that in the spirit of fair play I must point out to you the difference between my actual statement and the quotation which you attributed to me. Mr. Simpson appears to know all phases of the rubber situation. In fact, he strikes me as being the "Barney Baruch" of rubber.

Again, in the spirit of fair play, I hope you can correct this discrepancy in your next issue.

Very truly yours,
ANDREW L. SOMERS
Chairman, House Committee on
Coinage, Weights, and Measures

June 25, 1942
Washington, D. C.

THEOP—New Plasticizer for Synthetic Rubber

A NEW plasticizer for synthetic rubber, called Theop, made from raw materials which are readily available in commercial quantities on a non-priority basis, has been introduced by the Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y., from whom the following data on its properties and uses has been obtained:

Theop has the following physical characteristics:

Consistency	Fluid, somewhat more viscous than glycerine
Color	Light yellow
Odor	Nil
Specific Gravity (28°/28° C.)	1.00
Free Fatty Acid	0.8%
Saponification Value	275-285
Iodine Value	72
Titre	<10° C.
Volatility	Nil (4 hours at 105° C.)
Solubilities:	
Water	Insoluble
Mineral Oil	Soluble (hot)
Alcohol	Complete
Petroleum Hydrocarbon Solvents	Insoluble
Aromatic Hydrocarbon Solvents	Soluble
Vegetable Oils	Complete
Acetone	Complete
Chloroform	Complete

Theop is compatible with nitrocellulose, ethyl cellulose, rosin, ester gum, and synthetic resins. It is non-corrosive and has been suggested as a non-aqueous lubricant for leather and as a dye solvent for printing inks, carbon paper and typewriter ribbons.

It will be noted that Theop is free from odor. This, together with its light color, makes it of interest in the manufacture of those items where these properties are of importance, as for example, synthetic rubber surgical and pharmaceutical goods, and novelties.

Theop is compatible with most types of synthetic rubber. As a plasticizer, it imparts a high surface sheen which may be due to a reaction product rather than due to a surface film of the plasticizer itself. In this connection, it is interesting to note that acetone, in which Theop is completely soluble, does not remove this surface lustre.

The use of Theop eliminates the need for a mold wash or lubricant for molded materials or for additional lubrication in extruded stocks. It also imparts high tensile strength, elasticity and elongation even to heavily loaded stocks.

No special procedure is necessary to utilize this material, ordinary synthetic rubber milling being adequate. It is suggested, however, that in conjunction with the more oil resistant types of synthetic rubber, such as Hycar O.R. and Perbunan, a small portion of Theop be added and allowed to digest before additional amounts are incorporated. Unlike such materials as mineral oils, vegetable oils and fats, and other plasticizers containing long aliphatic hydrocarbon chains, Theop, once incorporated into these oil resistant elastomers, does not produce a greasy surface, nor is it at all perceptible, either on the surface of the milled stock or in the material itself.

Oils, fats and plasticizers containing long aliphatic chains are very often objectionable in that they preclude the building of good tack or fusion during the cure. The general explanation for this is that because of original incompatibility with the oil-resistant synthetic rubber, these materials will tend to bleed or bloom to the surface during the cure, and so furnish lubrication for the joinings, causing ply separation.

Here, again, Theop is of considerable interest, for while it makes unnecessary the use of special mold washes or lubricant for easy release, it forms joinings which have a bonding strength equivalent to the tensile strength of the stock itself. This important and interesting characteristic has made it of special value in the manufacture of mechanical packings, gaskets, etc., where this property is of definite importance.

Non-volatility of Theop further aids in the formation of good fusion and permits molding of large articles without the danger of pitting or forming of pores in the surface of the finished product.

As a loader or extender, Theop is a satisfactory replacement for inert fillers. It is less expensive than the synthetic rubber, and unlike most pigments, adds to rather than detracts from the tensile strength of the stock, as well as to the softness. This property has been found useful in the manufacture of printers' rollers.

Although Theop can be used by itself as a plasticizer for most purposes, special results for more individual requirements can be met by blending it with other products. In particular, certain polyhydric alcohol esters are available which in combination with Theop give interesting plasticizers. Several of these have exceptionally low titres, and are therefore to be considered for low temperature work.

The oil resistance of synthetic rubbers, such as Hycar O.R. and Perbunan, is in no way diminished by using Theop as a plasticizer. It was found that a test piece made in accordance with the following formula when immersed in oil for seven days at a temperature of 160°F. showed a volume change of less than 1%:

Hycar O.R.	100.0
Altax	1.5
Theop	12.5
Zinc Oxide	5.0
Stearic Acid	1.0
Pelletex	120.0
Sulfur	1.5

This formula is given purely as an indication, and is in no way suggested as the ultimate formula.

A sample of the same stock immersed in benzol-type gasoline at room temperature showed a volume change of not more than 5%. Apparently some of the plasticizer was extracted in the latter test, but not sufficient to render the volume change great enough to affect the finished sample materially. The elasticity of the synthetic rubber so treated did not vary from that of the untreated material.

Properties and Uses of Resistoflex PVA—A Rubber-Like Compound

By HERMAN E. KREBS

Vice-President, Resistoflex Corp., Belleville, N. J.

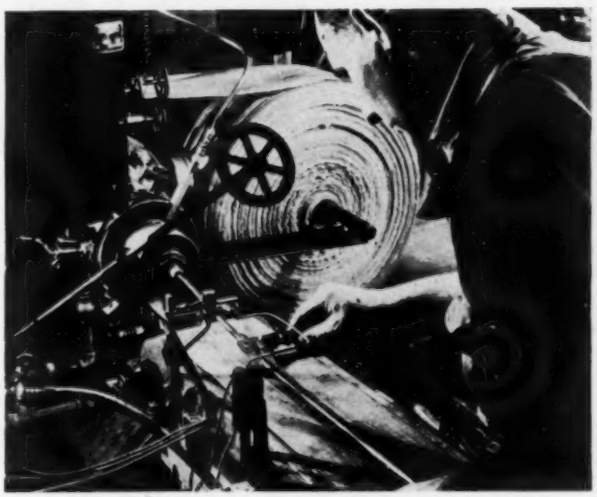
WITH rubber shortages facing even Army and Navy procurement officials, it becomes obvious that increased production of synthetic rubber alone is not going to ease the rubber crisis sufficiently. Other materials are already figuring prominently in the conservation battle, both for industry and war production purposes.

Some Industrial Applications

One such material which has been successfully used for sometime for both industrial and military applications is Resistoflex PVA, a tough, flexible, resilient synthetic resin. For example, the rubber conservation committee in a large Eastern war plant recently experimented with this material for scores of applications varying from gas, air, sand-blast and solvent hose to conveyor belts, gaskets, power transmission rings and aligning rings. Not only was it found a satisfactory substitute, but in most operations it actually outperformed the previously used rubber and synthetic rubber parts by a wide margin.

Solvent-proof, oil-proof, gas-proof Resistoflex hose is now being widely specified for fuel, oil, instrument and hydraulic lines on military equipment and on vital machine tools. This light flexible hose, which is completely unaffected by fuels and oils, including the diesel fuel and benzol-blend gasolines used in the Far East, complies with the specifications of the Quartermaster Corps and with the combined requirements of the Army Air Corps and the Navy Bureau of Aeronautics.

Checking thickness of milled Resistoflex sheet, held to plus or minus .001 of an inch.



Because of the translucence of the tubing, the extruder operator can maintain a constant check on quality as well as on dimensions

Description of Resistoflex

Technically speaking, Resistoflex is not a synthetic rubber, but a rubber-like compound formulated from a synthetic resin, which, until partly processed, is neither thermoplastic nor thermosetting. Unlike rubber and synthetic rubber, it does not require breaking down on a mill or vulcanizing, for its transformation into a tough, resilient flexible material takes place entirely during the extrusion or molding processes. These, as well as the preliminary mixing and milling, employ a similar type of equipment to that used for rubber, but differ considerably in method and execution. In milling, for example, the customary blanket is not built up on one of the rolls, but instead a thin and semi-cohesive ribbon is produced.

While Resistoflex PVA material is being used to replace both natural and synthetic rubber in many operations, its properties vary considerably from those of

TABLE 1. PHYSICAL PROPERTIES OF TWO TYPICAL RESISTOFLEX PVA COMPOUNDS

Property	*Extruded*	*Molded*
Tensile strength, lbs. per sq. in.	5236	2121
Elongation, % in 2 in. at break	213	445
Permanent Set,* %	78	80
Cold flow,† %	63.2	63.6
Dielectric strength,‡ volts per mil	6.10	10.70
Electrical conductivity, ohm-cm.	3.1×10^{7}	3.8×10^{7}
Thermal conductivity, cal. per sec. per sq. cm./1°C. per cm.	5×10^{-4}	18×10^{-4}

* This is the percentage elongation measured after stretching to three-fourths of ultimate elongation, holding for ten minutes, releasing, and allowing to recover for ten minutes.

† This is the percentage deformation of a 0.5-in. cube subjected to a pressure of 4,000 lbs. per sq. in. at 120°F. for 24 hours and allowed to recover for 24 hours.

‡ Test made at 72°F. and 50% relative humidity.

the latter two substances. Like rubber, it is both flexible and resilient, but this is about as far as one can carry the comparison. Actually it is not a rubber substitute, but rather a synthetic material which is equal to synthetic rubber for some applications, vastly superior to it for others, and completely unsuitable for still others.

Characteristics peculiar to this material include light weight, great tensile strength, high resistance to vibration and flexing, inertness to gasoline, oil and organic solvents, including the aromatic and chlorinated hydrocarbons, and negligible permeability to gases and solvents. While laboratory tests have been far exceeded in service and hence found relatively inconclusive in evaluating the superior operating qualities and increased service life of Resistoflex products, many of the physical and chemical properties responsible for the performance of these products are indicated in the accompanying tables condensed from laboratory reports.

It should be noted here that some of the commonly used tests or indices of rubber or synthetic rubber are meaningless when applied to Resistoflex PVA compounds. Elongation, for example, while useful as a gauge of rubber quality, has no bearing on the quality of these compounds. The Geer oven test cannot be used to determine their aging characteristics because, as has been demonstrated by the prolonged oxygen bomb test included in Table 1, they are not subject to oxidation; while being hygroscopic, they are completely desiccated and devitalized by the warm, dry air of the oven.

On this testing device low-pressure automotive hose is subjected to oil at 250° F. at a pressure of 250 lbs./sq. in.; flexing through an 8-inch circle at 250 r.p.m.; vibration at the rate of 1800 cycles per minute of ¼-inch amplitude; and torsional stresses of 3° at this same high rate.

Wide Range of Applicability

The range of uses for Resistoflex PVA compounds extends all the way from tubing and hose, oil-proof and solvent-proof gloves and aprons, gaskets, washers and mechanical molded goods to paints and coating solutions. Semi-finished sheet material is available to the rubber industry which can readily be stamped into blanks and remolded in flash-type or semi-positive type molds, using standard rubber equipment.

Rubber manufacturers using this material, however, should remember that it is formulated in many different standard and special compounds which vary considerably in durometer hardness, cold flow, temperature range and other characteristics. It is even suggested that rubber manufacturers desiring to make mechanical molded shapes from Resistoflex PVA material submit a single cavity experimental mold plus complete specifications to the Resistoflex factory which

TABLE 2. EFFECT OF VARIOUS SOLVENTS ON THE PHYSICAL PROPERTIES OF A TYPICAL EXTRUDED RESISTOFLEX PVA COMPOUND; SAMPLES IMMERSED IN SOLVENTS FOR 240 HOURS AT ROOM TEMPERATURE

Test	*Specific Gravity at 72°F.*	*Shrinkage or Expansion in Six In., %*	*Tensile Strength Lbs./Sq. In.*	*Elongation in Two In., %*	*Hardness (Durometer)*
Original material before immersion	1.259	...	5,236	213	85
66% gasoline by volume, 24% ethanol, 10% benzene	1.195	—1.0	5,057	180	86
Gasoline (leaded)	1.250	—0.30	5,255	220	85
Kerosene	1.255	+0.30	5,247	220	84
Benzene (benzol)	1.251	+0.30	5,290	225	84
Xylol	1.260	+0.20	5,351	220	84
Acetylene gas	1.256	+0.10	5,340	220	85
Methylene dichloride	1.261	—0.40	5,110	225	84
Trichlorethylene	1.253	+0.10	5,140	225	86
Carbon tetrachloride	1.259	0.00	5,084	145	84
Monochlorbenzol	1.258	+0.10	5,026	190	84
Methanol (anhydrous)	1.203	—6.50	5,980	195	86
Ethanol (anhydrous)	1.181	—4.30	5,779	190	87
Ethylene glycol	1.186	+4.70	4,335	185	77
Acetone	1.246	—1.20	5,203	175	87
Petrohol	1.224	—1.30	5,971	165	89
Furfurol	1.250	—2.00	5,890	175	88
Methyl acetate	1.269	—0.70	5,403	185	85
Ethyl Acetoacetate	1.258	—0.50	5,491	205	85
Diethyl ether	1.260	—0.30	4,980	230	86
Dioxane	1.271	—1.30	5,272	195	85
"Freon" gas	1.270	—0.50	5,636	205	86
Butane gas	1.268	+0.30	5,352	200	86
Propane gas	1.267	+0.20	5,529	200	87
Sulfur dioxide	1.269	+0.50	5,497	215	86
Aniline	1.256	—0.70	5,557	185	86
Formamide	1.201	—4.00	3,845	195	77
Oxygen bomb accelerated aging test 300 lbs. oxygen pressure at 160°F. for 240 hours	1.259	+0.10	4,990	220	86

TABLE 3. PERMEABILITY TO LIQUIDS OF A TYPICAL EXTRUDED RESISTOFLEX PVA COMPOUND AT 77° F.

	Gasoline	*Benzene*
Pressure above atmosphere	Nil	Nil
Permeability, liters per sq. m. per 24 hours per 0.01-cm. thickness	.058	.057
Specific permeability, c.c. per sq. centimeter per centimeter thickness per minute	$.04\times10^{-6}$	$.04\times10^{-6}$

submits samples made of the most suitable compound, together with instructions for subsequent processing.

The reason why Resistoflex hose is being used for gasoline lines on trucks, buses and automobiles as well as for instrument and hydraulic lines on airplanes is due not only to its inertness to aromatic fuels and to oils previously mentioned but also to the fact that the inner surface of the hose does not tend to swell or slough off. It has no tendency to cause clogging of the carburetor or injector nozzles; the inner diameter remains constant, assuring a full and complete fuel and oil flow at all times.

These same non-swelling characteristics, combined with the ability to withstand a wide range of operating temperatures without loss of its innate strength or its resistance to vibration and flexing, have recommended it for heavy-duty equipment such as road-building machinery, tractors, shovels, etc., and for a wide variety of hydraulic, lubrication and solvent lines on automatic industrial machinery.

Another development has been a paint spray hose which is not only unaffected by paint and lacquer thinners, but, being non-porous and particularly dense, resists the internal adhesion of the pigments used. Oxyacetylene welding and cutting hose, hydraulic hose for machine tools, and chemical hose for the handling of certain fire extinguisher fluids, dry-cleaning and degreasing solvents, and other organic oils and liquids are still further applications where Resistoflex products have proved superior to those previously used.

Low Permeability an Asset

The low permeability of Resistoflex PVA materials has made possible the fabrication of a truly gas-tight refrigerant hose which is lighter in weight than the flexible metal hose used in the past and is capable of withstanding much more severe vibration, flexing and torsional stresses.

Resistoflex gloves, for handling solvent-laden objects, have greatly reduced occupational diseases, such as folliculitis and dermatitis, by offering complete protection against insoluble sulfur-base cutting oils, petroleum or naphtha solvents, carbon tetrachloride, trichlorethylene, benzol, ether, chloroform, ethylene dichloride, Varsol, etc. Furthermore, they contain no sulfur and therefore can be used for the handling of finely-polished metal parts without danger of tarnishing the metal. A companion product is Resistoflex work apron made either of an unreenforced transparent sheet or a tightly woven fabric heavily coated with Resistoflex PVA material.

In the field of mechanical molded goods, Resistoflex sheets, both clear and in combination with fabrics, are being used for diaphragms, gaskets, washers, etc., and molded into a wide variety of articles including wipers,

The products seen above were all cut or molded from compounded sheets supplied by the Resistoflex Corp. They are impervious to oil and organic solvents of all kinds and possess high tensile strength and abrasion resistance.

vibration mountings, aligning rings and power transmission rings, where the toughness of Resistoflex compounds assures a long service life.

Uses of the Liquid Form

Resistoflex PVA compounds in liquid form are being used to impregnate or coat fabric, paper, wood, leather and other materials in order to protect them against attack by organic solvents. A special solution has been prepared for coating metal hooks and baskets used in the handling of finely polished metal parts through degreasing operations in the automotive, aircraft and other industries. Still another variant is Resistoflex paint developed for coating and gas-proofing wood, plaster board, and composition fibre board used in the construction of fumigating chambers and similar rooms.

TABLE 4. PERMEABILITY TO GASES OF A TYPICAL EXTRUDED RESISTOFLEX PVA COMPOUND AT 77° F.

	Hydrogen	*Oxygen*	*Acetylene*	*Nitrogen*
Pressure, lbs. per sq. in.	26.48	27.25	25.01	29.21
Pressure above atmospheric, lbs. per sq. in.	11.77	12.54	10.3	14.50
Permeability, liters per sq. m. per 24 hours per 0.01-cm. in thickness	1.41	.51	2.34	0.114
Specific permeability—c.c. per sq. centimeter per centimeter thickness per minute	$.98\times10^{-6}$	$.35\times10^{-6}$	1.63×10^{-6}	$.08\times10^{-6}$
Permeability, liters per sq. m. per 24 hours per 0.01-cm. thickness extrapolated to 1 atmosphere	.78	.27	1.38	.06

Abstracts of United States Patents on the Compounding and Use of Synthetic Rubber

By FREDERICK MARCHIONNA, M. S. Chem.

(Continued)

Schmidt—U. S. Pat. 1,901,045—March 14, 1933. *Polybutadiene Films.* (Assigned to I. G. Farbenindustrie A. G., Germany).

Insoluble and chemically resistant films are obtained by forming a solution of a polybutadiene rubber in an organic volatile solvent, depositing such a solution in a supporting surface, and after drying, heating it at a temperature below 200° C. in the presence or absence of oxygen. Thus, a 3% cyclohexane solution of sodium butadiene rubber is spread on a glass plate into a thin film, the solvent allowed to evaporate at 40° to 50° C. in air, and allowed to stand in air at normal temperature to obtain inextensible self-supporting films. The deposition of the polybutadiene solution can be effected on a base to be permanently coated, which is treated as above to obtain lustrous and strongly adherent coatings. If such films are heated at 50° to 60° C. for 10 to 16 hours under a pressure of about 100 atmospheres there results a glass-clear pliable film having great tensile strength. When the polybutadiene rubber solution is to be used for coating articles by spraying about 5% of a drier, *e.g.*, manganese linoleate, may be incorporated, and pigments added, if desired, to produce quick drying, colored coatings.

Tschunkur et al—U. S. Pat. 1,906,667—May 2, 1933. *Polybutadiene Rubber Vulcanizates.*

A vulcanized product of good quality is produced by mixing at least 10% of natural rubber with sodium butadiene rubber, incorporating therein vulcanizing ingredients and from 20 to 70% carbon black, and vulcanizing, thereby obtaining a rubber having a tensile strength of 180 to 250 kg/cm². In one example, sodium polybutadiene polymerized in the presence of 50% of natural rubber (100) is admixed with carbon black (50), sulfur (3), zinc oxide (15), stearic acid (4), and D.P.G. (1) and cured at 130° to 140° C. In another example, 70 parts of a co-polymer from equal parts of isoprene and dimethyl butadiene in the form of an aqueous emulsion are mixed with 30 parts of natural rubber and 50 parts of carbon black and vulcanizing ingredients added as in the first example, then cured. In still another example, sodium butadiene rubber (100) and natural rubber (100) are dissolved in a suitable solvent and mixed with oil soot (80), a soft resin as disclosed in British Pat. 323,322 (4), zinc oxide (6), ammonium oleate (2), sulfur (5), D.P.G. (0.6), and mercaptobenzothiazole (0.6), and this vulcanizable solution is used for impregnating fibres which are then cured in the ordinary manner.

Maximoff—U. S. Pat. 1,910,846—May 23, 1933. *Polybutadiene Latex Products.* (Assigned to Naugatuck Chemical Co., Naugatuck, Conn.).

Aqueous dispersions of synthetic rubber from butadiene compounds are obtained by preparing an aqueous emulsion of the butadiene in the presence of a soap, which may be formed *in situ* allowing the butadiene to polymerize to produce a synthetic rubber latex, and using such latex for producing rubber articles. Thus, dimethyl erythrene (100) is emulsified in water (350) containing 10% ammonia, and oleic acid (8.7) added to form a soap *in situ*, and the resulting emulsion is allowed to stand at room temperature for 8 days in the presence of 18 parts of 3% hydrogen peroxide added to the emulsion to form a latex from which any monomer is removed by heating the latex above the boiling point of the erythrene. This latex may be admixed with any quantity of natural latex and used as such or coagulated with acid. If to the above erythrene emulsion containing 70 cc. of 3% H_2O_2 there is added 18 cc. of turpentine or other terpene, and the emulsion polymerized, there is obtained a yield of 65% of rubber.

Maximoff—U. S. Pat. 1,910,847—May 23, 1933. *Polybutadiene Latex Products.* (Assigned to Naugatuck Chemical Co., Naugatuck, Conn.).

The emulsion of polybutadiene, isoprene, dimethylerythrene, etc., obtained as described in U.S. Pat. 1,910,846, is used for softening natural rubber, after which the butadiene is polymerized. Thus, crepe rubber is softened with dimethyl butadiene in any desired quantity and the mixture then emulsified in water containing ammonium oleate as emulsifying agent and hydrogen peroxide as polymerization catalyst to produce an aqueous dispersion containing natural rubber and dimethyl butadiene. This dispersion when allowed to stand for a few days at room temperature will comprise an artificial latex containing natural rubber and synthetic butadiene rubber uniformly dispersed in the aqueous medium. Reclaimed or vulcanized rubber may be used in the above method.

Bock and Tschunkur—U. S. Pat. 1,911,672—May 30, 1933. *Vulcanized Polybutadiene.* (Assigned to I. G. Farbenindustrie A.G., Germany).

A soft, rubber-like vulcanizate comprises a vulcanized diolefine polymer and finely divided soot, the diolefine having the formula

$$CH_2=C-C=CH_2$$
$$\quad\;|\quad\;|$$
$$\quad X\quad X$$

in which X may be hydrogen or methyl. In one example, erythrene or isoprene (100) is shaken with a solution of egg albumen (4) in water (50) which contains lamp black (15), and the emulsion is polymerized at 60° to 70°C. The resulting polymer (17) is mixed with sulfur (0.7), the piperidine salt of piperidyldithiocarbamic acid (0.07), magnesium carbonate (3), and lamp black (6). The uniform mass is rolled and cured at 143°C. for one hour to obtain a soft rubber-like vulcanizate having an index of strength between 40,000 and 150,000. In another example, gas black (20), sulfur (3.15), zinc oxide (9.4), and diphenylguanidine (1) are admixed with a polymerized sodium butadiene (78) and the mixture cured as above. The resulting vulcanizate has a tensile strength of 130 to 150 kgs./sq. cm., at a stretch of 600 to 800%.

Tschunkur and Bock—U. S. Pat. 1,911,729—May 30, 1933. *Tire Composition.* (Assigned to I. G. Farbenindustrie A.G., Germany).

A composition particularly adapted to the manufacture of tires comprises from 20 to 70% of carbon black and a co-polymer of dimethyl butadiene with a compound of the formula

$$CH_2{=}C{-}C{=}CH_2$$
$$\quad\quad |\quad\quad |$$
$$\quad\quad X\quad H$$

where X is either hydrogen or a methyl radical group and includes butadiene and isoprene, the co-polymer being obtained in the form of an aqueous emulsion. In the example given, 50 parts of each of dimethyl butadiene and isoprene are emulsified in water by means of sodium stearate and allowed to polymerize. The co-polymer (100) is admixed with carbon black (50), zinc white (15), stearic acid (2), tar (4), sulfur (1), and the decahydroquinaldyl salt of decahydroquinaldine-dithiocarbamic acid (1), and the mixture molded into a tire tread, bonded to the carcass of the tire, and cured at 140°C. for one hour to obtain a high grade tire.

Bock et al—U. S. Pat. 1,915,745—June 27, 1933. *Interpolymers of Butadiene.* (Assigned to I.G. Farbenindustrie A.G., Germany).

An interpolymer produced by the polymerization of a butadiene with alpha-vinyl naphthalene, polyvinyl naphthalene, etc., in the form of latex containing butadiene (65), vinyl naphthalene (10), 10% aqueous sodium oleate (100), a normal solution of NaOH (3), which is polymerized for five days at 90°C., is compounded with gas black (50), zinc oxide (15), rosin (2), wood tar (2), sulfur (15), and accelerator (1.8), the quantities being calculated in 100 parts of the interpolymer. When this mass is vulcanized there is obtained a rubber product of great elasticity.

Goost—U. S. Pat. 1,918,466—July 18, 1933. *Vulcanized Polybutadienes.* (Assigned to I. G. Farbenindustrie A.G., Germany).

A synthetic rubber having great tensile strength is obtained by vulcanizing a mixture of sodium butadiene rubber (100), carbon black (60), zinc oxide (15), stearic acid (2.5), sulfur (2.5), and accelerator (1).

Damsel—U. S. Pat. 1,931,922—October 24, 1933. *Composite Gasket.*

A composite gasket comprises a ring of rubber as described in U. S. Pat. No. 1,541,601, and a plastic coating bonded thereto, this coating being from a polysulfide plastic containing 74 to 84% sulfur, and produced by reacting a polysulfide of an alkali metal with an olefine polyhalide. Such coating is non-porous, resists corrosion, is insoluble in oils, and has the same resiliency as the rubber packing ring itself, so that the coating will not crack or peel on flexing of the ring. This coating is preferably applied on the annular internal surface of the ring.

Zieser—U. S. Pat. 1,932,390—October 31, 1933. *Hard Synthetic Rubber.* (Assigned to I.G. Farbenindustrie A.G., Germany).

Hard rubber products are obtained by adding the necessary quantity of sulfur to a synthetic rubber from a sodium butadiene rubber, together with natural rubber and fillers. Thus, 50 parts each of smoked sheet rubber and sodium butadiene rubber are milled with sulfur (75), ground pumice (150), lime (5), and piperidine salt of piperidine dithiocarbamic acid (1), and the mass vulcanized at 150°C. for one and one-half hours to obtain an ebonite which is highly resistant to heat and chemicals. In another example, a mixture of sulfur (120), factice (20), D.P.G. (6), lime (20), magnesia (20), ground pumice (424), natural rubber (320), and sodium butadiene rubber (100) is rolled and vulcanized at 150°C. for one and one-half hours, obtaining a hard rubber which is more resistant to heat and chemicals than similar vulcanizates containing only natural rubber or butadiene rubber.

Tschunkur et al—U. S. Pat. 1,938,730—December 12, 1933. *Vulcanized Polybutadiene Polystyrol.* (Assigned to I.G. Farbenindustrie A.G., Germany).

A co-polymer obtained from a mixture of a butadiene compound with 15 to 40% of styrene is combined with vulcanizing agents and cured at the required temperature. Thus, butadiene isoprene, phenyl butadiene, etc. (100 to 130) plus styrene (20 to 30) is emulsified in water (150) containing sodium alkyl naphthalene sulfate (5) and allowed to polymerize. The co-polymer thus obtained (100) is admixed with carbon black (3), zinc oxide (15), softener (4), sulfur (3), and dithiocarbanilide (1) and vulcanized for two and one-third hours under a pressure of 3 atmospheres, thereby obtaining a mass of great tensile strength and elasticity. A similar vulcanizate is obtained by heating a mixture of a co-polymer consisting of polybutadiene (50), poly-alpha-methyl styrene (15), lamp black (60), zinc oxide (13.5), sulfur (0.9), stearic acid (1.5), and accelerator (1.6).

Williams—U. S. Pat. 1,950,436—March 13, 1934. *Plastic Polychloroprene.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

A plastic chloroprene having the physical properties of natural rubber is produced by polymerizing chloroprene at 5° to 30°C. until a viscous product is obtained from which any unpolymerized chloroprene is removed, leaving the plastic polymer as a residue. Various examples for obtaining such plastic products are given in detail. These plastic polymers, when vulcanized, have great resistance to oils, heat and chemicals. In one example, a plastic polychloroprene (100) is compounded with zinc oxide (30), clay (60), stearic acid (1), iron oxide (5), and hydroquinone (1), and dissolved in benzene to form a solution which is used for impregnating broadcloth, dried and cured at 135°C. A gasket for a pipe line is made by molding a mixture containing the plastic polychloroprene (100), thermatomic carbon (70), zinc oxide (25), lithopone, (5), stearic acid (1), and phenyl-beta-naphthylamine (1.5). A hose made from a fabric treated with the plastic polychloroprene is also described.

Patrick—U. S. Pat. 1,962,460—June 12, 1934. Reissue No. 19,487—March 5, 1935. *Soluble Polysulfide Plastics.*

The physical properties of Thiokol are improved by further polymerization in the presence of substances capable of developing acids during the hot cure of the material. Such substances include amphoteric metal halides, aniline hydrochloride, chloroprene, chlorinated rubber, etc. In one example, Thiokol (100) is compounded with chloroprene (100), zinc oxide (20), gas black (10), stearic acid (0.5), and diphenyl guanidine (0.5), and cured at 287° F. for 50 minutes thereby obtaining an improved product which is insoluble in benzene at 120° F. and flexible at —30° F. In another example, equal quantities of Thiokol and chloroprene (200), crude rubber (5), zinc oxide (5), gas black (50), and accelerator (1) is cured as above to obtain a similar product. In another, Thiokol is heated with chlorinated rubber. In still another, Thiokol (100) is compounded with chloroprene (25), zinc oxide (20), gas glack (10), diphenyl guanidine (0.5), and stearic acid (0.5), and cured at 287°F. for 50 minutes, obtaining a product which exhibits an elongation of only 3% in hot benzene at 120° F. after five days and causes only a slight perceptible discoloration of the solvent.

Lewis—U. S. Pat. 1,963,856—June 19, 1934. *Printer's Roll.* (Assigned to Vulcan Proofing Co., Brooklyn, N. Y.)

A specific embodiment of U. S. Pat. 1,846,810, in which the type of oil-proof and ink-resistant composition is used for making a printer's roll. The roll comprises the metal core which is covered with a layer of a vulcanizable rubber. After curing this layer there is superposed the oil and ink-resistant surface layer, after it has been buffed to ⅛-inch less than the final diameter. This surface layer is composed of the polyethylene polysulfide (100), natural rubber (40), cumar resin (20), carbon black (15), zinc oxide (15), sulfur (1.63), 0.5 each of paraffine, burgundy pitch and stearic acid, D.P.G.

(0.5), and mercaptobenzothiazole (0.375). The roll thus formed is subjected to a final cure by heating at 287°F. so as to cause adherence of the polysulfide plastic to the rubber.

Barrett et al—U. S. Pat. 1,967,220—July 24, 1934. *Emulsified Polychloroprene.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

The alkali water-soluble salts of alkyd resins are used for dispersing or emulsifying polychloroprene rubber. In one example, an alkyd resin is produced from a mixture of glycerol (29.73) and phthalic anhydride (70.27) heated for one hour at about 200°C., the resulting resin having an acid number from 140 to 170. This resin is neutralized and dissolved in an aqueous solution of an alkali metal or ammonia, forming a 2% solution. About 50 parts of chloroprene are dispersed in this solution and the emulsion allowed to stand at 0° to 10°C. from 24 to 72 hours, obtaining a polychloroprene latex which is used for forming films, threads, etc. The alkyd resin used may be one modified with 25% castor oil or china wood oil, or 35% stearic acid modified alkyd resin, etc.

Williams—U. S. Pat. 1,967,275—July 24, 1934. *Impregnating Articles.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

Porous bases, such as leather, wood, cloth, tile, etc., are impregnated with chlorobutadiene or bromobutadiene, and then treated to polymerize the halobutadiene. Some examples are given:

I—A kid leather is dipped in a bath containing chloroprene (50) in benzene (50), turpentine (1), benzoyl peroxide (1). The impregnated leather is wrapped in tin foil to prevent evaporation and allowed to polymerize for six days, thereby obtaining an oil-resistant leather.

II—A block of pine wood (147 grs.) is placed in a vacuum chamber containing the same chloroprene solution as in I so as to cover the whole block with the solution. The vacuum is broken, the saturated block removed and then placed in a closed vessel where the chloroprene is allowed to polymerize for six days to obtain a block weighing 162 grs.

III—A broadcloth roll is dipped in the same chloroprene solution as in I and air blown through it, after which it is wrapped in tin foil and allowed to polymerize for six days to obtain a waterproofed cloth.

IV—A porous tile block (92 grs.) is placed in a liquid chloroprene and allowed to impregnate. After six days the chloroprene will polymerize in the tile causing it to weigh 27 grs. more.

Carothers and Collins—U. S. Pat. 1,967,860—July 24, 1934. *Polychloroprene Products.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

This patent deals with the control of the polymerization of chloroprene by incorporating in the monomer a solvent for the chloroprene and the polychloroprene having a boiling point above or below 200°C., or by adding to the chloroprene a polymerizable monomeric substance, such as styrene or isoprene, and then polymerizing the mixture. The patent also discloses that the product thus obtained, which may be soluble or insoluble in benzene, may be employed in the preparation of paint, varnishes, and coating materials. Thus, 50 parts of chloroprene are dissolved in toluene and allowed to stand for about 16 days to obtain 36% of a polychloroprene in the form of stiff jelly from which the chloroprene and toluene may be removed by evaporation. About 120 parts of this polymer, in the form of 50% toluene solution, is diluted with toluene (317), compounded with Titanox (67.5) and phenyl-beta-naphthylamine (0.6), and worked in a ball mill for 24 hours to obtain a sprayable solution which is filmed and dried into an elastic coating in one and one-half hours. Or, 200 parts of a 27% solution of the polychloroprene jelly are worked in a ball mill with carbon black (9.4) and an antioxidant as above, diluted with xylene and filmed into a coating on leather, rubber, metal, brick, fabric, etc., which is dried in 16 hours.

Collins—U. S. Pat. 1,967,861—July 24, 1934. *Polychloroprene Latex.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

A polychloroprene latex is obtained by emulsifying chloroprene in the presence of an alkali metal soap, magnesium oleate, triethanolamine oleate, etc., the emulsion being allowed to polymerize in the form of a latex which can be combined with natural latex in any desirable quantity. The emulsification and polymerization may be carried out in various ways and conditions to produce plastic and/or elastic polymers. In one example, 10% of carbon black is added to a chloroprene containing sodium alkyl naphthalene sulfonate and a little ammonia to form a paste which is diluted with twice its volume of water containing 1% of sodium oleate, and the emulsion allowed to polymerize at 10° C. for one day, thereby obtaining a polychloroprene latex containing colloidal carbon black uniformly dispersed. Such a latex can be used for coating articles by spreading, spraying, etc. In another example, 150 parts of zinc oxide dispersed in water are added to 200 parts of a polychloroprene latex, and used as coating material. In still another example, 5% of a resin extracted from guayule rubber, or 10% of dibutyl phthalate or spindle oil, etc., is added to a chloroprene solution containing an antioxidant, and allowed to polymerize into a latex. The aqueous emulsions may be prepared also from solutions of the chloroprene in xylene, etc.

Collins et al—U. S. Pat. 1,967,863—July 24, 1934. *Fibre Treatment.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

Fibre products are impregnated, coated and/or finished with polychloroprene in the form of solutions in organic solvents or in the form of latex. Thirty-one examples are given, of which the following are typical:

I—Absorbent crinkled paper (as described in U. S. Pat. 1,791,248) is impregnated with either a 14% polychloroprene solution in toluene or 20% latex containing phenyl-beta-naphthylamine and soap to obtain a pliable and tear-resistant paper.

II—A teal fabric consisting of cotton fabrics laminated together with rubber is cured for two hours at 124° C. after having been impregnated with a chlorobutadiene polymer, and is then spread with a coating of a 21% toluene solution of the same polymer, air dried and cured at 124° C. for one hour to obtain a water-repellent fabric.

III—A linen thread is passed through a bath of toluene solution of the polymeric chlorobutadiene to obtain a stronger thread which can be woven into fabric.

IV—A composition consisting of plastic polychloroprene (77), mineral oil (1.6), aluminum oxide (1), stearic acid (1), and zinc oxide (20) is calendered on a rubberized fabric or leather, etc., to which a polychloroprene bonding cement has been applied.

V—A leatherette, consisting of a rubberized fiber sheet, is coated with an aqueous dispersion containing polychloroprene (9%) and shellac (3%) and is cured for one and one-half hours at 121° C. The surface is treated with bromine.

VI—Leather can be finished with a lacquer of polychloroprene to obtain a glossy finish which is grease-repellent and does not flake.

VII—An oil and grease-proof paper container is obtained by coating the container with a dispersion containing polychlorobutadiene (11.5), casein (11.5), and ammoniated water containing a small quantity of soap (76). Instead of this coating, the paper container may be coated by dipping it in a polychloroprene-alkyd resin composition dissolved in toluene, the glyptal resin being an oil-modified resin (15) which is heated with a polychloroprene (35) at 100° C. for three hours.

VIII—A cloth is calendered with an asphalt-polychloroprene dough containing polychloroprene (24), flour asphalt (20), clay (43), carbon black (5), zinc oxide (6), and small quantities of stearic acid, mineral oil, and an aluminum oxide.

(To Be Continued)

Revised Price Schedule No. 87—Scrap Rubber

THE preamble and Sections 1 to 10, inclusive, of Revised Price Schedule No. 87 are amended and renumbered and are issued as Revised Price Schedule No. 87, as Amended—Scrap Rubber.

On January 31, 1942, Price Schedule No. 87 was issued, establishing maximum prices for the principal kinds of scrap rubber, consisting of tires, tire parts and tubes. As then stated in the preamble to the Schedule: The war being waged with the Japanese Empire made uncertain the future shipments of rubber from the Far East. In order to conserve for military and essential civilian purposes the rubber stockpile already accumulated in this country, it was necessary to curtail sharply the consumption of rubber in the manufacture of products not essential to the immediate national defense. This restriction upon the processing of crude rubber was expected to cause a marked increase in the use of such materials as reclaimed rubber which serve as substitutes for crude rubber. The demand for scrap rubber, the material from which reclaimed rubber is made, was expected to expand sharply, thereby producing grave danger of further price increases.

Scrap rubber prices had been rising steadily in recent months. The maximum prices fixed by Price Schedule No. 87 were based on prices prevailing shortly before the outbreak of the war in the Pacific.

Because of the vital importance to the nation's war effort of keeping the cost of substitution of reclaimed rubber for crude rubber to a minimum, the Office of Price Administration fixed the price of reclaimed rubber by Price Schedule No. 56. As an essential and integral part of the Government's rubber program, and in order to make the other steps effective, it was necessary during the present emergency to establish the maximum prices for scrap rubber set forth in Price Schedule No. 87. Price Schedule No. 87, by order issued February 17, 1942, was re-issued under Section 206 of the Emergency Price Control Act of 1942 as Revised Price Schedule No. 87.

This Revised Price Schedule No. 87, as Amended, continues in effect the maximum prices in effect under Revised Price Schedule No. 87 and establishes additional maximum prices for sales of scrap rubber not included in Revised Price Schedule No. 87.

In the judgment of the Price Administrator, the prices of scrap rubber, for which no maximum prices were established in Revised Price Schedule No. 87, have risen to an extent and in a manner inconsistent with the purposes of the Emergency Price Control Act of 1942. The Price Administrator has ascertained and given due consideration to the prices of such scrap rubber prevailing between October 1 and October 15, 1941 and has made adjustments for such relevant factors as he has determined and deemed to be of general applicability. So far as practicable, the Price Administrator has advised and consulted with representative members of the industry which will be affected by this Schedule.

In the judgment of the Price Administrator, the maximum prices established by this Revised Price Schedule No. 87, as Amended, are and will be generally fair and equitable and will effectuate the purposes of the Act. A statement of the considerations involved in the issuance of this Revised Price Schedule No. 87, as Amended, has been issued simultaneously herewith and filed with the Division of the Federal Register.

1. *Maximum prices for scrap rubber.* On and after June 26, 1942, regardless of any contract, agreement, lease or other obligation, no person shall sell or deliver scrap rubber to a consumer, and no consumer shall buy or receive scrap rubber, at prices higher than the maximum prices set forth in Appendix A hereof; and no person shall agree, offer, solicit or attempt to do any of the foregoing: Provided, that a sale of scrap rubber articles or materials to a person who acquires them solely for the purpose of resale, or to repair or recondition them to make them re-usable for their original purpose, shall not be deemed a sale to a consumer.

2. *Licensing.* The provisions of Supplementary Order No. 5—Licensing, are applicable to every dealer subject to this Revised Price Schedule No. 87, as Amended, selling scrap rubber to a consumer. The term "dealer" as used in this section shall have the meaning given it by Supplementary Order No. 5—Licensing.

3. *Sales for export.* The maximum prices at which a person may export scrap rubber shall be determined in accordance with the provisions of the Maximum Export Price Regulation issued by the Office of Price Administration.

4. *Applicability of the General Maximum Price Regulation.* The provisions of this Revised Price Schedule No. 87, as Amended, supersede the provisions of the General Maximum Price Regulation with respect to sales and deliveries for which maximum prices are established in this Schedule.

5. *Less than maximum prices.* Lower prices than those set forth in Appendix A may be charged, demanded, paid or offered.

6. *Adjustable pricing.* No person subject to the provisions of this Revised Price Schedule No. 87, as Amended, shall enter into any agreement permitting the adjustment of the prices of scrap rubber to prices which may be higher than the maximum prices, except that any person may offer or agree to adjust or fix prices to or at prices not in excess of the maximum prices in effect at the time of delivery. In an appropriate situation, where a petition for amendment or for adjustment or exception requires extended consideration, the Price Administrator may, upon application, grant permission to agree to adjust prices upon deliveries made during the pendency of the petition in accordance with the disposition of the petition.

7. *Evasion.* The price limitations set forth in this Revised Price Schedule No. 87, as Amended, shall not be evaded whether by direct or indirect methods, in connection with an offer, solicitation, agreement, sale, delivery, purchase or receipt of or relating to scrap rubber, alone or in conjunction with any other commodity or by way of commission, service, transportation or other charge, or discount, premium or other privilege, or by tying-agreement or other trade understanding or otherwise.

8. *Records and Reports.* (a) Every person making a sale or purchase of scrap rubber subject to this Re-

vised Price Schedule No. 87, as Amended, after February 5, 1942, shall keep for inspection by the Office of Price Administration for a period of not less than one year complete and accurate records of (1) each sale or purchase showing the date thereof, the name and address of the buyer and the seller, the price paid or received, and the quantity of each grade purchased or sold, and (2) the quantity of each grade of scrap rubber on hand and on order, as of the close of each calendar month.

(b) Such person shall submit such reports to the Office of Price Administration and keep such other records in addition to or in place of the records required in paragraph (a) of this section as the Office of Price Administration may from time to time require or permit.

9. *Enforcement.* (a) Persons violating any provision of this Revised Price Schedule No. 87, as Amended, are subject to the criminal penalties, civil enforcement actions, license suspension proceedings and suits for treble damages provided for by the Emergency Price Control Act of 1942.

(b) Persons who have evidence of any violation of this Revised Price Schedule No. 87, as Amended, or any price schedule, regulation or order issued by the Office of Price Administration or of any acts or practices which constitute such a violation, are urged to communicate with the nearest district, state or regional office of the Office of Price Administration or its principal office in Washington, D. C.

10. *Petitions for amendment.* Persons seeking any modification of this Revised Price Schedule No. 87, as Amended, or an adjustment or exception not provided for therein may file petitions for amendment in accordance with the provisions of Procedural Regulation No. 1, issued by the Office of Price Administration.

11. *Definitions.* (a) When used in this Revised Price Schedule No. 87, as Amended, the term:

(1) "Person" includes any individual, corporation, partnership, association, or any other organized group of persons, or legal successor or representative of any of the foregoing, and includes the United States or any agency thereof, or any other government, or any of its political subdivisions, or any agency of any of the foregoing.

(2) "Scrap rubber" includes any waste or discarded rubber article or material usable for the production of reclaimed rubber or in the manufacture of any product.

(3) "Consumer" means any person consuming scrap rubber in the production of reclaimed rubber or in the manufacture of any product.

(4) "Ton" means a short ton of 2000 pounds net weight. Bags, coverings or containers shall not be included in the net weight.

(b) Unless the context otherwise requires, the definitions set forth in Section 302 of the Emergency Price Control Act of 1942 shall apply to other terms used herein.

12. *Effective dates of amendments.* (a) This Revised Schedule No. 87, as Amended, shall become effective June 26, 1942.

APPENDIX A

Maximum prices for scrap rubber.—(a) *Chief consuming centers.* The maximum prices listed in Tables I, II and III for each consuming center are applicable to every sale of scrap rubber to any consumer for use in a consuming mill located in such consuming center, regardless of the place from which the scrap rubber may have been shipped or where the actual sale may have been made.

TABLE I

(Dollars Per Short Ton. Maximum Prices at Consuming Centers.)

Kind of Scrap Rubber	Akron, Ohio	Buffalo, New York	Naugatuck, Conn.	East St. Louis, Illinois	Memphis, Tenn.	Gadsden, Alabama	Los Angeles, Calif.
Passenger Tires:(*1*)							
Mixed Passenger Tires(*2*)	$18.00	$17.50	$16.50	$16.40	$15.50	$14.00	$12.00
Beadless Passenger Tires(*3*)	24.00	23.50	22.12	22.00	20.88	19.00	16.50
Passenger S.A.G.(*4*)	18.50	18.00	17.00	16.90	16.00	14.50	12.50
Passenger Dykes(*5*)	24.00	23.50	22.12	22.00	20.88	19.00	16.50
Truck Tires:(*6*)							
Mixed Truck Tires(*7*)	18.00	17.50	16.50	16.40	15.50	14.00	12.00
Beadless Truck Tires(*8*)	24.00	23.50	22.12	22.00	20.88	19.00	16.50
Truck Dykes(*9*)	24.00	23.50	22.12	22.00	20.88	19.00	16.50
No. 1 Truck S.A.G.(*10*)	16.50	16.00	15.00	14.90	14.00	12.50	10.50
No. 2 Truck S.A.G.(*11*)	16.50	16.00	15.00	14.90	14.00	12.50	10.50
Solid Tires(*12*)	34.00	33.50	31.50	31.00	29.50	27.00	23.50

Specifications

(1) *Passenger Tires.* Shall consist of whole pneumatic tire casings having six plies or less, and shall be free from hard, oxidized, burnt, filled, non-pneumatic, single tube and motorcycle tires, and from leather and metal.

(2) *Mixed Passenger Tires.* This kind shall consist of black whole tires free from strip tires. White or colored sidewall tires are permissible. A maximum of 10% may consist of roadworn tires.

(3) *Beadless Passenger Tires.* This kind shall consist of Mixed Passenger Tires from which the beads have been cut but which conform otherwise to the specifications for Mixed Passenger Tires.

(4) *Passenger S.A.G.* This kind shall consist of pieces of pneumatic passenger tires from which the treads and beads have been removed and may or may not contain sidewall rubber.

(5) *Passenger Dykes.* This kind shall consist of beadless passenger tires from which two or more layers of fabric have been removed.

(6) *Truck Tires.* Shall consist of whole pneumatic tires casings for busses and trucks having seven plies or more, and shall be free from hard, oxidized, burnt, filled, non-pneumatic single tube tires, and from leather and metal.

(7) *Mixed Truck Tires.* This kind shall consist of black whole tires free from stripped tires. White or colored sidewall tires are permissible. A maximum of 10% may consist of Roadworn Tires.

(8) *Beadless Truck Tires.* This kind shall consist of Mixed Tires from which the beads have been cut but which conform otherwise to the specifications for Mixed Truck Tires.

(9) *Truck Dykes.* This kind shall consist of beadless truck tires from which two or more layers of fabric have been removed.

(10) *No. 1 Truck S.A.G.* This kind shall consist of pieces of pneumatic bus and truck tires from which the tread and beads, but not the sidewall, have been removed.

(11) *No. 2 Truck S.A.G.* This kind shall consist of a mixture of No. 1 Passenger S.A.G. with No. 1 Truck S.A.G. and may or may not contain sidewall rubber.

(12) *Solid Tires.* This kind shall consist of solid motor truck tires over two and one-half inches in width free from oxidized tires, industrial truck tires, metal, hard bases, fibre bases and cloth bases.

TABLE II

(Maximum Prices at Consuming Centers)

Kind of Scrap Rubber	Akron, Ohio; Buffalo, N.Y.; East St. Louis, Ill.; Gadsden, Ala.; Memphis, Tenn., Naugatuck, Conn.	Los Angeles, Calif.
	Dollars per short ton	
No. 1 Passenger Peelings(*1*)	$47.50	$40.00
No. 2 Passenger Peelings(*2*)	30.00	22.50
No. 3 Passenger Peelings(*3*)	27.50	20.00
No. 1 Truck Peelings(*4*)	47.50	37.50
No. 1A Truck Peelings(*5*)	50.00	38.75
No. 2 Truck Peelings(*6*)	30.00	22.50
No. 3 Truck Peelings(*7*)	27.50	20.00
No. 1 Light Colored (Zinc) Carcass(*8*)	52.50	40.00
No. 2 Light Colored Carcass(*9*)..	50.00	38.75
Gray Carcass(*10*)	47.50	37.50
Passenger Tubes:(*11*)	*Cents per pound*	
No. 2 Passenger Tubes(*12*)	7¾	7¼
Light Colored No. 2 Passenger Tubes(*13*)	8¼	7¾
Red Passenger Tubes(*14*)	7½	7
Black Passenger Tubes(*15*)	6¾	6¼
Mixed Passenger Tubes(*16*) ...	6¾	6¼
Truck Tubes:(*17*)		
No. 2 Truck Tubes(*18*)	7½	7
Red Truck Tubes(*19*)	7¼	6¾
Black Truck Tubes(*20*)	5¼	4¾
Two-Toned Black-Gold Tubes(*21*)	6¾	6¼
Two-Toned Red-Black Tubes(*22*).	6½	6

Specifications

(1) *No. 1 Passenger Peelings.* This kind shall consist of treads stripped from black pneumatic passenger tires. The material shall be free from fabric, metal, leather and hard, burnt, or oxidized treads.

(2) *No. 2 Passenger Peelings.* This kind shall consist of treads stripped from black pneumatic passenger tires. The material may contain cushion rubber, breaker fabric and sidewalls plus no more than one full ply of carcass fabric.

(3) *No. 3 Passenger Peelings.* (Bald Head Peelings). This kind is the same as No. 2 Passenger Peelings except that a part of the tread has been removed.

(4) *No. 1 Truck Peelings.* This kind shall consist of treads stripped from black pneumatic bus and truck tires. The material may contain cushion rubber, but shall be free from fabric, metal, leather, and hard, burnt, or oxidized treads. This grade may contain not more than 10% of No. 1 Passenger Peelings.

(5) *No. 1A Truck Peelings.* This kind shall have the same specifications as No. 1 Truck Peelings except these peelings shall be free from cushion rubber.

(6) *No. 2 Truck Peelings.* This kind shall consist of treads stripped from black pneumatic bus and truck tires. The material may contain cushion rubber, breaker fabric and sidewalls, but no more than one tull ply of carcass fabric.

(7) *No. 3 Truck Peelings.* (Bald Head Peelings). This kind is the same as No. 2 Truck Peelings except that a part of the tread has been removed.

(8) *No. 1 Light Colored Carcass.* This kind shall consist of all white zinc carcass free of black edges and any other colored rubber.

(9) *No. 2 Light Colored Carcass.* This kind shall consist of light colors as white, pink, light gray, pure gum and light brown carcass, free of all black edges and dark colored rubber.

(10) *Gray Carcass.* This kind shall consist of gray, and colors too dark for delivery under No. 2 Light Colored Carcass, and shall be free of all black edges and black rubber.

(11) *Passenger Tubes.* Shall consist of inner tubes for pneumatic passenger tires free from sections of tubes less than 12 inches long, free from truck, bus and puncture-proof tubes, crusty and oxidized tubes, and tree from metal and punchings. All passenger tubes, except Mixed Passenger tubes, shall be free from metal valves. All passenger tubes, except Mixed Passenger Tubes and Black Passenger Tubes, shall be free from black rubber valve cots and the bases of such valves.

(12) *No. 2 Passenger Tubes.* This kind shall consist of compounded passenger tubes free from black, red and two-toned passenger tubes.

(13) *Light Colored No. 2 Passenger Tubes.* This kind shall consist of No. 2 Passenger Tubes specially selected as to color by agreement between buyer and seller.

(14) *Red Passenger Tubes.* This kind shall be strictly RED tubes.

(15) *Black Passenger Tubes.* This kind shall be strictly black compounded passenger tubes. Black rubber valve cots and their bases may be present, but no metal valves or parts.

(16) *Mixed Passenger Tubes.* This kind shall consist of whole tubes of various colors and qualities and may contain valves unless otherwise specified in the purchase contract.

(17) *Truck Tubes.* Shall consist of inner tubes for pneumatic truck and bus tires, free from sections of tubes less than 12 inches long, and free from crusty, oxidized or puncture-proof tubes, metal and punchings. All truck tubes, except Mixed Truck Tubes, shall be free from metal valves and from black rubber valve cots and the bases of such valves unless otherwise specified in the purchase contract.

(18) *No. 2 Truck Tubes.* This kind shall consist of compounded truck tubes free from black, red and two-toned tubes.

(19) *Red Truck Tubes.* This kind shall be strictly RED tubes.

(20) *Black Truck Tubes.* This kind shall be strictly black compounded truck tubes. Black rubber valve cots and their bases may be present, but no metal valves and parts.

(21) *Two-Toned Black-Gold Tubes.* This kind shall be two-toned black and gold passenger or truck tubes.

(22) *Two-Toned Red-Black Tubes.* This kind shall be two-toned red and black passenger or truck tubes.

TABLE III

(Maximum Prices at All Consuming Centers)

Kind of Scrap Rubber	*Dollar per Short Ton*
Buffings(*1*)	$35.00
Bicycle Tires(*2*)	15.00
Passenger Tire Beads(*3*)	5.00
Truck Tire Beads(*4*)	7.00
Air Bags & Water Bags(*5*)	15.00
Air Brake Hose(*6*)	25.00
Miscellaneous Hose(*7*)	17.00
Mats & Matting(*8*)	15.00
Rubber Boots & Shoes(*9*)	33.00
No-Mark Soles & Trimmings(*10*)	35.00
Black Soles & Trimmings(*11*)	32.00
Rubber Heels(*12*)	16.00
Black Mechanical Scrap, above 1.10(*13*)	20.00
General Household & Industrial Scrap(*14*).....	15.00
	Cents per pound
Black Mechanical Scrap, 1.10 or below(*15*)....	5
Light Colored Mechanical Scrap, 1.10 or below(*16*)	10
Light Colored Mechanical Scrap, 1.30 or below(*17*)	5
Light Colored Mechanical Scrap, 1.50 or below(*18*)	4½
Light Colored Mechanical Scrap, above 1.50(*19*)	4
White or Light Colored Friction Scrap, Unprocessed(*20*)	10
Black or Mixed Friction Scrap, Unprocessed(*21*)	6
White or Light Colored Friction Scrap, Processed(*22*)	12½
Black or Mixed Friction Scrap, Processed(*23*)..	8½
Other Unvulcanized Scrap Rubber, White or Light Colored(*24*)	18
Other Unvulcanized Scrap Rubber, Black or Mixed(*25*)	9

Specifications

(1) *Buffings.* This kind shall consist of buffings from tires or rubber stocks comparable in quality to tires, and shall be free from fabric, asbestos, buffing brush wires and other extraneous materials.

(2) *Bicycle Tires.* This kind shall consist of bicycle tires, with or without beads, and shall be free from oxidized tires and metal valves.

(3) *Passenger Tire Beads.* This kind shall consist of the beads of all motor car tires having six plies or less.

(4) *Truck Tire Beads.* This kind shall consist of the beads of all motor car tires having seven or more plies.

(5) *Air Bags & Water Bags.* This kind shall consist of air bags or water bags free from metal and free from burnt, cracked rubber.

(6) *Air Brake Hose.* This kind shall consist of railroad air brake hose and shall be free from steam hose or any other kind of hose.

(7) *Miscellaneous Hose.* This kind shall consist of all types of rubber hose except air brake hose and be free from metal, rags and rope.

(8) *Mats & Matting.* This kind shall consist of all types of rubber mats, matting, stair treads, and shall be free from metal, rags and rope.

(9) *Rubber Boots & Shoes.* This kind shall consist of rubber boots and shoes, arctics, and tennis shoes, including black, white or colored boots and shoes, cloth top shoes and gaiters, and light all-rubber gaiters. It shall be free from leather, any composite non-rubber material, metal and other extraneous materials.

(10) *No-mark Soles & Trimmings.* This kind shall consist of rubber soles, and the trimmings from rubber soles, made from white or light colored stock but shall be entirely free from black rubber stock, metal, leather, wood, and other extraneous materials.

(11) *Black Soles & Trimmings.* This kind shall consist of rubber soles, and the trimmings from rubber soles, made from black rubber stock and shall be free from metal, leather, wood, and other extraneous materials.

(12) *Rubber Heels.* This kind shall consist of rubber heels with or without nails free from leather and wood.

(13) *Black Mechanical Scrap, above 1.10.* This kind shall consist of black rubber articles, free from fabric, metal, leather, wood and other extraneous materials and having a specific gravity above 1.10.

(14) *General Household & Industrial Scrap.* This kind shall consist of miscellaneous unsorted rubber articles collected from households or industrial, mining, commercial or similar establishments.

(15) *Black Mechanical Scrap, 1.10 or below.* This kind shall consist of all forms of black rubber articles free from fabric, metal, wood, and other extraneous materials, and having a specific gravity of 1.10 or below.

(16) *Light Colored Mechanical Scrap, 1.10 or below.* This kind shall consist of all forms of white or light colored rubber articles free from fabric, metal, wood, and other extraneous materials, having a specific gravity of 1.10 or below.

(17) *Light Colored Mechanical Scrap, 1.30 or below.* This kind shall consist of all forms of white or light colored rubber articles free from fabric, metal, wood, and other extraneous materials, and having a specific gravity above 1.10 and not exceeding 1.30.

(18) *Light Colored Mechanical Scrap, 1.50 or below.* This kind shall consist of all forms of white or light colored rubber articles free from fabric, metal, wood, and other extraneous materials, and having a specific gravity above 1.30 and not exceeding 1.50.

(19) *Light Colored Mechanical Scrap above 1.50.* This kind shall consist of all forms of white or light colored rubber articles free from fabric, metal, wood, and other extraneous materials, and having a specific gravity of more than 1.50.

(20) *White or Light Colored Friction Scrap, Unprocessed.* This kind shall consist of white or light colored unvulcanized factory scrap containing fabric.

(21) *Black or Mixed Friction Scrap, Unprocessed.* This kind shall consist of black unvulcanized factory scrap containing fabric, but may include white or light colored unvulcanized factory scrap.

(22) *White or Light Colored Friction Scrap, Processed.* This kind shall be the same as No. 20, except that it must be processed in accordance with standard trade practice.

(23) *Black or Mixed Friction Scrap, Processed.* This kind shall be the same as No. 21, except that it must be processed in accordance with standard trade practice.

(24) *Other Unvulcanized Scrap Rubber, White or Light Colored.* This kind shall consist of white or light colored unvulcanized scrap rubber, free of fabric and free of all extraneous materials.

(25) *Other Unvulcanized Scrap Rubber, Black or Mixed.* This kind shall consist of black unvulcanized scrap rubber, free of fabric and free of all extraneous materials, but may include white or light colored unvulcanized scrap rubber.

(b) *Other consuming mills.* (1) For any sale of scrap rubber of the kinds specified in Tables I and II to any consumer for use in a consuming mill not located in one of the consuming centers listed in Tables I and II, the applicable maximum prices shall be those set forth in Tables I and II for the one of the consuming centers there listed to which the freight charge on scrap rubber from such consuming mill is lowest. If to any such consuming mill the freight charge on scrap rubber from two or more of the consuming centers listed in Tables I and II is equal and it is not lower from any of the others, the maximum prices applicable to sales for consumption in such mill shall be the prices set forth in Tables I and II for the one of those consuming centers with equal freight rates whose maximum prices are lowest.

(2) For any sale of scrap rubber of the kinds specified in Table III to any consumer for use in a consuming mill not located in a consuming center, the applicable maximum prices shall be those set forth in Table III.

(c) *Scrap rubber not meeting grade specifications.* The highest grade or quality of each kind of scrap rubber is defined by the specifications set forth in the footnotes to Tables I, II and III of paragraph (a) of this section. All prices listed represent respectively the maximum prices for the highest grade or quality of each kind as so defined. The presence of one or more of the objectionable features specified in the respective grade or quality specifications shall be deemed to lower the quality of the particular kind of scrap rubber sold. Any sale of scrap rubber of lower quality than that specified in Table I, II or III for the respective kind shall be made at an appropriate differential, below the maximum price for that kind listed in Table I, II or III and commensurate with the difference in quality involved.

(d) *Delivered prices.* The prices specified in this Appendix are the maximum prices that may be paid by any consumer, or charged by any person, for scrap rubber sold to a consumer and delivered to the consumer's mill. The maximum prices set forth shall include all transportation costs. If the seller does not deliver the scrap rubber to the consumer's mill, the maximum prices shall be the maximum prices specified in paragraphs (a), (b) and (c) of this section, less the lowest applicable published charges for transportation by rail, water or truck carrier to the consumer's mill, or if no such charges are published, the direct costs actually involved in transporting the scrap rubber to the consumer's mill.

(e) *Packing.* (1) The prices specified in this Appendix represent maximum prices for scrap rubber that is packed as follows:

(i) Mixed and beadless passenger and truck tires, solid rubber tires and bicycle tires may be shipped bundled or loose in cars.

(ii) All other kinds of scrap rubber shall be packed in bags or bales, with each kind packed separately. Each bale shall weigh not less than 500 pounds nor more than 1500 pounds and shall be well and securely bound.

(2) Any sale of scrap rubber not packed in accordance with the provisions of this paragraph must be made at appropriate differentials below the maximum prices specified in paragraphs (a), (b) and (c) of this section.

Issued this 26th day of June, 1942.

LEON HENDERSON
Administrator

Amendment No. 6 to Supplementary Order No. M-15-b-1

Supplementary Order No. M-15-b-1 is hereby amended as follows:

1. By striking out Items (11) and (12) under the heading "Passenger Friction" in subdivision (b) of List 7 attached thereto and substituting the following:

PASSENGER FRICTION

Description of Product	*Compounds to Be Used*	
	Passenger Friction	*Tread*
* * * * * * *		
(11) Industrial pneumatic tires:		
(i) Single tube—all sizes	E	(including F tube)
(ii) Straight side—under 6.00 (except 4.00-8 regular and H.D.)	E	F
(iii) Straight side—6.00 and up	D	C
Exception 1—4.00-8 regular ...	FF	F
Exception 2—4.00-8 heavy duty	D	C
(12) Industrial solid tires:		
(i) Stretch-on or hollow center	—	F
(ii) Molded-on for hand operated vehicle	—	FF
(iii) Molded-on for power driven or power drawn vehicles	—	A
(iv) Pressed-on	—	A
(v) Metal base demountable	—	A

2. By inserting the following new paragraph immediately after paragraph (b) (15) thereof:

(16) Rubber insulating tape, List 16.

3. By attaching thereto the attached additional list designated, List 16.

This order shall take effect as of the date of its issuance.

Issued this 12th day of June, 1942.

J. S. KNOWLSON,
Director of Industry Operations

List 16—*Specifications for the manufacture of rubber insulating tape.*

(1) Rubber insulating tape shall be manufactured only from an unvulcanized or partially vulcanized Rubber and Reclaimed Rubber compound.

(2) The thickness shall be .027 inches, plus or minus .003 inches.

(3) Rubber, as defined in paragraph (a) (1) of Supplementary Order No. M-15-b, shall not be used in proportions which will require more than seven pounds of rubber per 27,000 square inches of tape.

(4) No latex shall be used in the manufacture of such tape.

Editorials . . . . . .

Scrap Rubber Campaign

THE nation-wide scrap rubber drive, which was concluded on July 10 after it had been extended ten days by official decree, has turned up approximately 450,000 tons of miscellaneous scrap. Final figures on the campaign are not available at this writing, but collections through July 3 amounted to 334,293 tons, or about 5.07 pounds per capita. Since the last week was accompanied by a fanfare of publicity, it is probable that total collections will reach the 450,000 ton figure.

The results of the drive—sufficient to assure reclaiming mills of at least one full year's operation, not taking into consideration scrap on hand and available from regular trade channels—vindicate the estimates of available scrap made by reliable government officials, particularly those connected with the Rubber Branch of the War Production Board. It dispels for all time fantastic claims regarding the total amount of scrap collectible, one of which reached the unbelievable figure of 10,000,000 tons.

There is no question but that a sustained drive would have brought more scrap rubber to light. In fact we would like to see the drive extended indefinitely with filling stations maintained as neighborhood depots. Prices and methods of collection can be left in the hands of the efficient Petroleum Industry War Council, headed by William Boyd, sponsors of the recently concluded drive. In no other manner can general household scrap reach the market, since the total amount of rubber by weight which can be contributed or sold by the average household is too negligible for usual collection methods.

Although not all of the collectible scrap was turned in during the campaign just ended, it is doubtful whether much greater quantities are available, since no campaign for scrap ever received such whole-hearted national cooperation. Daily newspapers contributed news and advertising columns liberally, oil companies pushed the campaign with paid space, radio announcers reminded listeners of the necessity for scrap rubber almost hourly, posters were on hand everywhere, the average citizen was not allowed to overlook the necessity of turning in his scrap for one moment.

Irrespective of settling the question as to how much scrap rubber is collectible—outside of regular trade channels—the just ended scrap rubber drive will have one irrevocable result: It will enable reclaimers to operate at capacity and thus contribute their full share to the war program for the next few years. That simple fact is more important than all of the controversy which surrounded the campaign.

The Proposed Rubber Agency

AS this issue goes to press the controversy over the synthetic rubber program continues in high gear. The farm bloc, insistent on the use of grains for the production of butadiene, has even gone so far as to introduce legislation aimed at setting up a "rubber supply agency." This agency would have centralized control over the entire synthetic rubber program and since, according to the bill introduced, its director would have to be approved by the Senate, the farm bloc would certainly see to it that any appointee was in full sympathy with the utilization of farm products.

We can sympathize with the desire of the farm bloc to force the use of farm products for the production of butadiene, but cannot condone its method. Attempting to set up another agency to handle the synthetic rubber program is bound to lead to still further confusion on the overall rubber situation. Then, too, the creation of the agency proposed is somewhat dangerous since it would take out of the hands of the President the right to control priorities, thus setting up dual authority. We are firmly opposed to any system of setting up new agencies to take charge of special phases of the war production program.

CURRENT NEWS OF THE MONTH

NEW SYNTHETIC RUBBER LEGISLATION AND SCRAP RUBBER DRIVE FEATURES OF MONTH

DEVELOPMENTS on the rubber situation, in all of its broad phases, continue fast and furious. Highlights of the past month included the extension and termination of the nation-wide scrap rubber drive launched by President Roosevelt last month, introduction of legislation seeking a centralized agency to control the production of synthetic rubber, increased activity on the part of the Rubber Reserve Company to secure increased supplies of crude rubber from Latin America, placing of all scrap rubber under price ceilings, new restrictions on the consumption of rubber, additional amendments to the Revised Tire Rationing Regulations, and efforts on the part of various manufacturers to have their special processes adopted in the synthetic rubber program. Each of these developments is discussed in some detail below.

Of special interest during the past month was the national scrap rubber drive launched by President Roosevelt on June 15. Although originally intended to go through June 30 only, the drive was extended 10 days to July 10 at the request of the President, primarily because of the poor results reported in the original allotted period.

Although final results of the complete drive are not available at this writing (July 11), William Boyd, Jr., chairman of the Petroleum Industry War Council, reported to President Roosevelt on July 5 that scrap rubber collections through July 3 totaled 334,293 tons, or about 5.07 pounds per capita. It is probable that final collection totals will run between 400,000 and 450,000 tons.

Warns on Tire Requisitioning

As an indirect result of the scrap rubber drive—the totals of which bear out reliable estimates of amounts collectible—President Roosevelt warned the public at a press conference on July 7 that the government may have to requisition every automobile tire in the United States if conditions become worse than they are now. He added that the rubber-gasoline program is so complex that no person understands it completely.

It was learned that some dissension arose between government officials concerning the 10 day extension of the scrap rubber drive. Donald Nelson, head of WPB, protested the fact that the extension had been ordered by Petroleum Coordinator Harold Ickes without his knowledge. Mr. Nelson had planned a major drive to salvage various materials, including rubber, and had been forced to postpone the drive because of the rubber drive extension.

During the early stages of the scrap rubber drive the charge was made that scrap rubber dealers were reaping huge profits from the drive by the simple expedient of buying rubber turned in at filling stations at the one-cent-a-pound rate set by the government. Properly sorted and graded the scrap brings much higher prices in regular trade channels. These dealers were accused also of hoarding large scrap piles, waiting for still better prices in the trade.

Charles M. Haskins, managing director of the National Association of Waste Material Dealers, Inc., which has constantly urged dealers throughout the country to collect all kinds and types of rubber for use as scrap, including dealers who normally handle rubber and those whose efforts generally lie in other directions, assailed these charges in a statement issued on June 28. He asserted that dealers who were holding better grades of scrap rubber were doing so only because they can get no shipping instructions for the supplies. He also stated that it was quite likely stocks accumulated in the nation-wide collection drive would receive priority in movement to reclaiming plants.

WPB Denies Scrap Hoarding

In a statement issued by the Bureau of Industrial Conservation on July 6 it was said that the large scrap rubber piles seen in dealers' yards are not being hoarded and in practically every case the piles are being held for government disposal. Representatives of the Bureau, all of them thoroughly experienced in the scrap rubber business, are inspecting yards belonging to leading dealers in every section of the country. Their reports indicate that nearly 100% of the dealers so far visited have either sold or agreed to sell their whole stock of scrap rubber to Rubber Reserve.

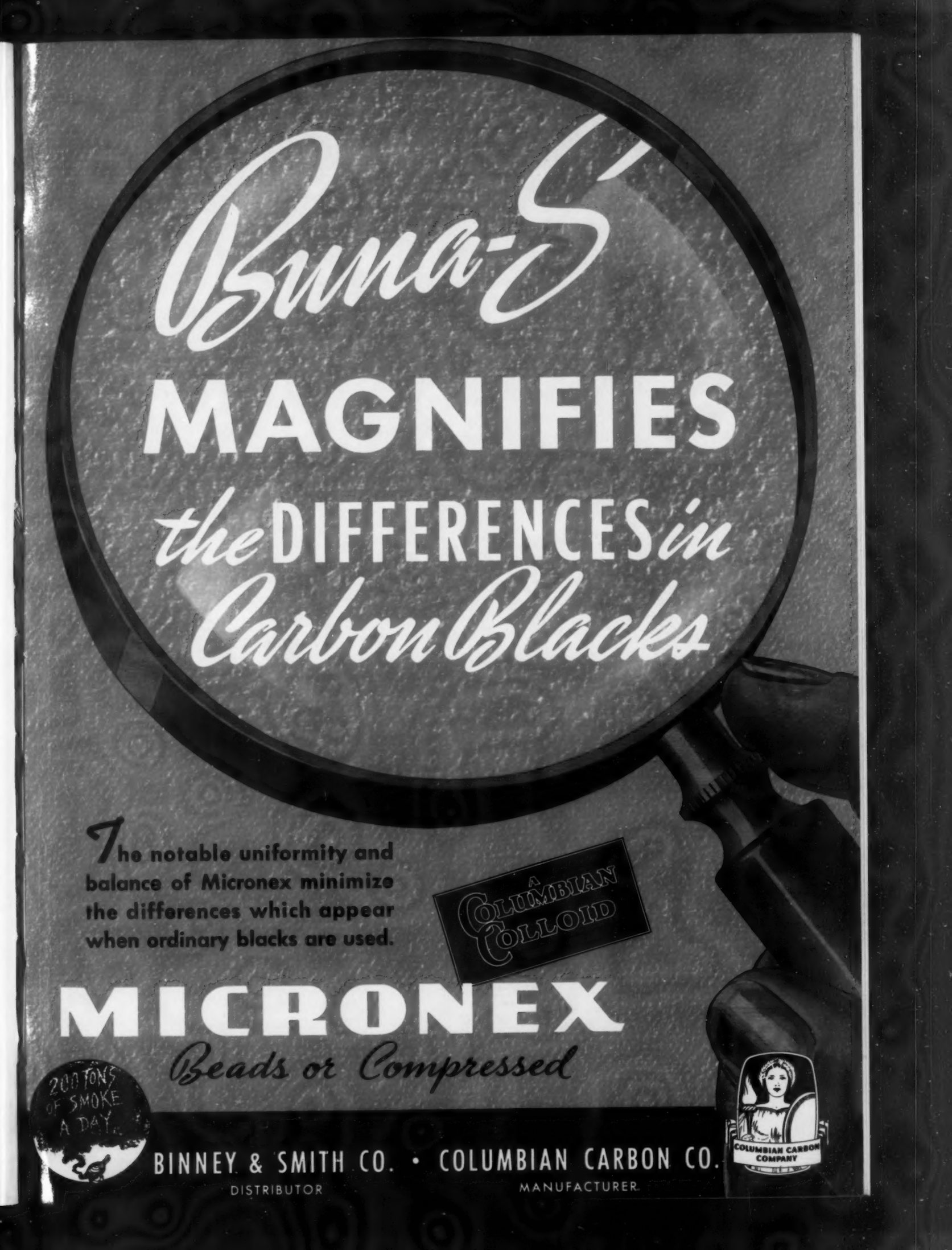
The Bureau's statement also stressed the point that dealers have been told by Rubber Reserve not to load freight cars until full shipping instructions are received. As a consequence, many scrap stockpiles now belonging to the government remain unmoved in dealers' yards and lend an appearance of hoarding. These piles will be removed as fast as transportation arrangements can be completed.

The charge has also been raised that certain reclaiming plants are refusing to accept certain types of scrap rubber. This is true in a sense only, since the actual situation is that reclaimers are insisting that the scrap be properly sorted and classified before it reaches their factories, following usual trade practice. As a consequence, accumulations of scrap and even loaded freight cars will be held up until arrangements can be completed to bring the scrap to dealers who will sort and classify it to match the classifications established in the latest price ceiling order on scrap rubber.

National Cooperative Spirit

The scrap rubber collection campaign received the whole-hearted cooperation of the nation. The daily press published thousands of items concerning the efforts of individuals and companies to ferret out the scrap and turn it in to the national stockpile. Of special interest, however, was the advertised offer of Gimbel's, prominent New York department store. Gimbel's offered to furnish at no cost whatsoever a substitute mat for every automobile rubber mat brought to its store. The substitute mat was said to "look like rubber, feel like rubber, and to be ridged like rubber." There is considerable debate in the trade as to the specific value of reclaiming automobile mats, which have very low rubber content.

In the belief that the total quantity of scrap rubber on hand will not become known until the junk and scrap dealers reveal amounts they have on hand, the House Committee on Coinage, Weights and Measures, which has been conducting its own investigation into the rubber situation, under the counsel of Elliot Simpson, self-styled independent rubber dealer, announced on June 26 that it was sending out 100,000 questionnaires to dealers and salvagers requesting a certified inventory of their present rubber stocks. The action was taken, according to Representative Somers, chairman of the committee, following testimony which indicated that hundreds of thousands of tons were available throughout the country.


Buna-S
MAGNIFIES
the DIFFERENCES in
Carbon Blacks
The notable uniformity and balance of Micronex minimize the differences which appear when ordinary blacks are used.
A COLUMBIAN COLLOID
MICRONEX
Beads or Compressed
200 TONS OF SMOKE A DAY
BINNEY & SMITH CO. • COLUMBIAN CARBON CO.
DISTRIBUTOR
MANUFACTURER
COLUMBIAN CARBON COMPANY

THE PIONEER *Semi-Reinforcing* RUBBER CARBON

FURNEX

BEADS OR DENSE

A COLUMBIAN COLLOID

BINNEY & SMITH CO. • COLUMBIAN CARBON CO.

DISTRIBUTOR MANUFACTURER

In testimony given before the Senate agricultural subcommittee investigating the synthetic rubber situation, Dr. Harry S. Rogers, chief of the Rubber Branch of WPB, stated that the scrap rubber collection campaign would probably total 500,000 tons and that 75 to 80% of this could be converted into reclaimed rubber. This total, he said, would include rubber in the hands of manufacturers and dealers. He termed the estimate that there was 10,000,000 tons of scrap rubber in the country as "fantastic" and added "if we have as much as 500,000 tons we'd be rather fortunate."

TIRE EQUIPMENT

Production and delivery of tire manufacturing machinery after July 11, unless specific authorization is obtained from the Director of Industry Operations, is prohibited under the terms of General Limitation Order L-143, issued on July 4. The order imposes similar restrictions on the reconditioning and rebuilding of used tire machinery and equipment. Also prohibited is the purchase of parts for such equipment except for repair of actual breakdowns. Specific equipment covered by the order included the following: Tire building machines; tire and tube watch case vulcanizers; tire and tube pot heaters, molds and matrices; tire flat rings; tube mandrels; horizontal tire and tube vulcanizers; tire and tube mold steel backs; gooseneck bead presses; bead winders; tire building drums; and tire vacuum boxes.

Formation of a tire industry technical committee was announced early this month by the Bureau of Industry Advisory Committees of WPB. Members of the new committee are: H. E. Elden (Dunlop), W. W. Benner (Lee Rubber), Luther Martin (U. S. Rubber), T. G. Graham (Goodrich), C. J. Jahant (General Tire), V. L. Smithers (Smithers Labs.), Harry Soulen (Mansfield Tire), T. E. Pittenger (Firestone), W. S. Wolfe (Goodyear), and H. P. Schrank (Seiberling). C. S. Reynolds, chief of the technical section of the Rubber Branch of WPB, is government presiding officer of the committee.

ELASTIC FABRIC

The use of elastic fabric, whether knitted, woven or braided, containing rubber core or covered rubber thread, is prohibited except for the manufacture of certain essential health items and military products, by the terms of Conservation Order M-174, issued by WPB on June 20, effective June 24. Permissible health items were listed as follows:

Edging for baby pants; Industrial shoes, belting and flexible metallic hose; repair cords and webs manufactured from rubber thread of the sizes permitted by Conservation Order No. M-124 or from scrap or tag ends of less than 5 feet in length; Sanitary belts, subject to the provisions of Limitation Order No. L-137; Surgical elastic bandages; Surgical stockings; Supports for abdomen, back and breast, subject to the provisions of Limitation Order No. L-90; Trusses, including umbilical belts; Webbing for respirators, hose masks, gas masks, inhalators, and goggles.

The order provides that in addition to military products the restrictions imposed on elastic fabric shall not apply "to any elastic fabric which can be shown to the satisfaction of the Director of Industry Operations to be unsuitable or unnecessary as substitutes" in the production of any of the permissible articles. Applications for such exceptions must be made in writing. An amendment to the order, issued on June 27, provides that any person who has filed application regarding any elastic fabric believed to be "unsuitable or unnecessary as substitutes" may, pending action on such application, "use an amount of such elastic fabric held by him not in excess of 10% of his inventory thereof on June 20, 1942."

The use of elastic fabrics in the manufacture of sanitary belts, sanitary crotch shields, and athletic supports and suspensories is restricted by Limitation Order L-137, issued by WPB on June 18. Elastic fabric in a sanitary belt may not exceed 3/8ths of an inch in width and 8 inches in length per garment in sizes up to and including a 32-inch waist measure. Larger sizes may use elastic fabric up to 7/8ths of an inch in width and 10 inches in length per garment. In sanitary crotch shields, elastic fabrics may be used up to 3/4ths of an inch in width and 16 inches in length per garment if the fabric has a stretch of 125% or more, or up to 3/4ths of an inch in width and 20 inches in length for fabric with less stretch.

The use of additional elastic fabric in surgical type corsets is permitted for the benefit of expectant mothers, physically disabled persons, and persons having sagging muscles, by the issuance of Amendment No. 1 to Limitation Order L-90, issued by WPB on June 13. In addition, manufacturers are allowed to use various kinds of elastic fabric in other types of corsets, girdles, panty-girdles, and combinations to enable them to use up inventories of elastic fabric.

The amendment also permits the production of inner belts for corsets, girdles, panty-girdles, and combinations, under specified restrictions. In the original limitation order, the use of elastic fabric in such belts was prohibited. On the other hand, the amendment further curtails the use of elastic fabric in hose supporters. Corsets, girdles and combinations, classified into three types in the original order, are reclassified into four types. Surgical corsets are put into two different groups.

SAFETY EQUIPMENT

Amendment No. 2 to General Limitation Order L-114 on safety equipment by WPB on June 17 permits the use of rubber for purposes detailed by Supplementary Order No. M-15-b, as amended. The original safety equipment order listed specific permitted uses for rubber. This was considered an unnecessary duplication of the regulations of the over-all rubber order and accordingly the amendment was issued. The use of synthetic rubber in the manufacture of safety equipment is permitted by the amendment, subject to specific authorization by WPB, as is the use of synthetic plastics when necessary for the efficient operation of hazard-measuring devices.

In order that there may be no delay in the production of certain textiles, apparel and related articles essential to the war program, a method by which war procurement agencies of the government may enter into contracts and receive deliveries of these commodities pending OPA action on applications for adjustment of ceiling prices was announced by OPA on June 19. The action was taken through the issuance of Amendment No. 2 to Maximum Price Regulation No. 157, which became effective July 1. The regulation applies to rubber fabrics, apparel and footwear among other commodities.

CONSERVATION EFFORTS

Continuing its conservation efforts on rubber, the Office of the Quartermaster General announced on July 2 that all future procurement of service shoes for enlisted men will utilize the new type of special composition sole developed several months ago by Army technicians. Strictly speaking, the sole, officially known as the Black Carbon Rubber Tap, is a half sole, composed of carbon black, small amounts of reclaimed rubber, and an even smaller content of crude rubber.

The average black rubber tap purchased on the Army's June schedule contained 25% crude rubber, or approximately 3/10ths of a pound per pair of shoes, plus 1/10th of a pound of reclaim. In the July purchasing plan, the crude rubber content was cut to 1/10th of a pound per pair of service shoes. From August on, all purchases of service shoes will dispense entirely with the use of crude rubber in the composition sole.

In order to give the service shoe more wear and traction, the composition sole or tap is sewed and nailed to the regular leather single sole. The special sole is believed to be the best sole ever used on most types of terrain by the Army.

The Quartermaster General has also revealed that a change in specification of the regular issue, four-buckle overshoe (worn over the service shoe) has resulted in a sharp saving in its rubber content. This shoe was redesigned several months ago with an estimated saving of several hundred thousand pounds of crude rubber in procurements for the early part of this year. The latest change, involving the substitution of a waterproof top for the rubber top previously used, will save an estimated 556,000 pounds of crude rubber on each million pair purchased.

Heels for all service shoes purchased by the Quartermaster Corps during July will contain no crude rubber and only a small amount of reclaim. Starting in August, a half-heel with a wooden core, developed by Goodrich (see page 328-A), will substitute for the present whole rubber heel. This change is expected to save the Army at least 2,000,000 pounds of crude rubber and perhaps double that amount of reclaim.

Maximum prices at which the Transcontinental Rubber Corp., of New York, may sell two items of waterproof footwear which it is manufacturing under special WPB permit have been established by Order No. 1, under Maximum Price Regulation No. 132, issued by OPA on June 9. The items on which ceilings were set are two kinds of latex women's footholds, rubbers that cover the forepart of the shoe only.

CONSUMPTION REPORTS

In a letter sent to the rubber manufacturing industry on June 24, Dr. H. S. Rogers, chief of the Rubber and Rubber Products Branch of WPB, advised that reports must be filed by every rubber manufacturer on Form PD-49 every month. These reports must be filed to reach the Rubber Branch by the tenth of each month whether or not a monthly reminder is forwarded by that branch.

Form PD-49, it was stressed, has been slightly revised. Reports on the form now include compounded latex and anyone who owns or consumes compounded latex, except shoe adhesives and container-sealing compounds, must report on the form. The form also provides a column for a report on the production of reclaimed rubber as well as one for scrap generated by the manufacturer's own operations prior to April 1, 1942. Reports on Form PD-332 are no longer necessary.

In his letter, Dr. Rogers also stressed the fact that the consumption of crude rubber to make masterbatches for sale is not permitted under Supplementary Order M-15-b, as amended. Anyone wishing to use masterbatches, however, may purchase crude rubber and have it processed by a masterbatcher as his agent. In that case, the user of the masterbatch will, of course, have to obtain a permit from the Rubber Reserve Co. to purchase the rubber and will have to report the consumption on Form PD-49.

In concluding, Dr. Rogers summarized the statistical data which the Rubber Branch should receive regularly, in the form of reports, as follows: (1) PD-49 to be filed monthly by all owners and/or consumers of latex, including compounded latex, crude rubber, scrap or reclaimed rubber; (2) PD-330 to be filed before consuming latex, including compounded latex, crude rubber or reclaimed rubber to fill War Orders; and (3) PD-407 to be filed monthly by those who wish authorization to consume scrap or reclaimed rubber for products on the 'F" list. Failure to secure reports by the requested date may at any time be considered sufficient cause for withholding future allocations.

Predicts Rubber Shortage

According to testimony given by Brigadier General L. D. Clay, of the Army General Staff, before the House Appropriations Committee on June 26, a potential crude rubber shortage is indicated for 1942 and 1943. He set the shortage at 250,000 tons. Gen. Clay estimated the combined military and essential civilian needs of the country for the coming year at 1,100,000 tons, adding that the potential shortage of 250,000 tons is conditional on the Army's reducing its own rubber requirements by as much as 150,000 tons.

In his testimony, Gen. Clay put the current stockpile of crude rubber at 762,000 tons in this country and Great Britain, with 150,000 additional tons in the hands of American rubber manufacturers. He said the Army was expecting additional imports of 120,000 tons during 1942 and 1943, and that during the same period it was expecting 320,000 tons of Buna rubber. He termed the synthetic rubber figure an "optimistic" one, adding that in his own opinion it was actually 25 to 30% higher than could be counted on.

SEEK LEGISLATION TO CENTRALIZE PRODUCTION OF SYNTHETIC RUBBER

As a result of long weeks of hearings on the synthetic rubber situation conducted by a Senate agricultural subcommittee, headed by Senator Gillette of Iowa, which still continue at this writing, a group of farm senators, seeking to force the government to make greater use of surplus farm commodities in the production of synthetic rubber, introduced a bill in the Senate on June 18 establishing centralized control of production and processing of this material. Companion bills were introduced to the House on the same day by Representative A. A. Johnson, of Illinois, and K. E. Mundt, of South Dakota. Senators Gillette, Wheeler, Thomas, McNary and Norris introduced the bill to the Senate.

The bill, as introduced to the Senate, would set up a rubber supply agency with a director of rubber supplies appointed by President Roosevelt subject to the consent and advice of the Senate. The director would be paid a salary of $10,000 a year and could have no other vocation, employment or financial interest outside of his job. The director's duty would be "to expedite the prosecution of the war by making provision for an increased supply of rubber manufactured from alcohol produced from agricultural or forest products." Specifically, the bill provides:

1. That the director of rubber supplies must make available a supply of rubber sufficient to meet military and civilian needs;

2. That the director make available at the earliest possible time an adequate supply of alcohol from agricultural products to meet military and civilian needs;

3. That the director be empowered to make loans or advances for production of rubber or alcohol from grains; to purchase, lease, or otherwise acquire plants, equipment, facilities, and materials as may be necessary for processing or production of rubber and alcohol; to provide by contract or otherwise for the utilization of land, plants, and other facilities which may be necessary to produce rubber and alcohol from agricultural products; to employ a research staff to aid in the development of facilities to produce rubber from agricultural or forest products.

In explaining the measure, Senator Gillette stated that "the German and Soviet armies travel on synthetic rubber made in large part from potatoes and grain crops. . . . Rubber from farm crops can be produced at reasonable cost, needs less precious materials for plant construction, and, most vitally important, we can produce tires in eight months from the time plant construction is authorized." Under terms of the bill, copies of all contracts, plans and processes for the manufacture of synthetic rubber would be made available to the director of rubber supplies.

Aims at Preventing Monopoly

For the purpose of preventing the monopolistic control of the synthetic or artificial rubber industry, or of the production of alcohol from agricultural or forest products, no private corporation, or group of corporations affiliated through stock ownership or otherwise shall be permitted to control more than 10 per cent of the production of total rubber requirements or more than 10 per cent of the materials from which rubber is made, the bill states.

It is understood that members of the agricultural subcommittee favor William L. Batt, until recently director of materials for WPB, for the post of director of rubber supplies. Mr. Batt, it is understood, has endeavored on several occasions to induce WPB to use the Russian method of producing rubber from grains and is believed highly in favor of establishing a rubber-from-agricultural-products industry.

The Senate bill was referred to the Senate Agriculture Committee which, on June 24, unanimously approved the legislation.

In commenting on the bill, Senator Smith, of South Carolina, said that

while it authorizes the President to appoint an agency head the Senate would not approve appointment of a man antagonistic to producing rubber from grains. He added that "it would have been foolish for us to wait for the President to do something about setting up this agency. He would have waited and waited and probably never done anything. Under this legislation he will have to get busy and set up a centralized rubber authority, and if he should happen to appoint some of the men now administering our rubber program, he will find that the Senate just won't confirm such a character." He admitted he was referring to various WPB executives, including Arthur Newhall, Rubber Coordinator.

Numerous senators have contended that WPB officials favor production of synthetic rubber from petroleum and have been blocking attempts of midwestern interests to obtain priorities on limited amounts of materials to build rubber-from-grains factories. Referring to the bill, Senator Thomas, of Oklahoma, said, "We have got to get rid of the petroleum factions who are running the production of synthetic rubber."

Nelson Opposes Legislation

Firm opposition to the bill was made by Donald Nelson, head of WPB, before the Senate agricultural subcommittee on July 6. Mr. Nelson said he was opposed to the manufacture of synthetic rubber from farm commodities on the ground that the plants requested would require "critical material needed for the war effort." He stated that the proposed legislation would not help but would merely hinder the synthetic rubber program because the required constructional materials "would have to be taken away from the munitions program."

In answer to a question from Senator Norris as to the specific reason why Mr. Nelson opposed the setting up of the proposed rubber supply agency, with the powers conferred on it by the terms of the pending bill, the latter replied that "It would be dangerous because it would take out of the hands of the President the right to control priorities, among other things."

In reply to a charge from Senator Norris that "you are doing nothing about increasing the rubber supply through the use of farm commodities," Mr. Nelson said that WPB was definitely planning to do something about making synthetic rubber from such commodities without going into any building program to do the job. In the light of this revelation, Senator Gillette, chairman of the subcommittee, stated that the subcommittee would defer action on the bill until Mr. Nelson could elaborate on these plans. This he is expected to do within the next week or two.

Following Mr. Nelson's testimony, Senator Gillette proposed that the government cancel some of its contracts to produce butadiene from petroleum and build new facilities for the production of this raw material from grain. He again repeated the assertion that the production of butadiene from alcohol derived from grain is a more simplified and cheaper process. He claimed that "grain-alcohol plants can be built with one-tenth of the critical materials and in from one-third to one-fourth of the time that it takes to construct a petroleum process plant."

RUBBER FROM ALCOHOL

Evidence was introduced before the Senate agricultural subcommittee on July 6 showing that J. M. Weiss, a rubber expert employed by the Army and Navy Munitions Board, reported that the method used for making butadiene from grain alcohol by the Publicker Commercial Alcohol Co., of Philadelphia, could be employed on a large scale. Mr. Nelson then stated that an investigation of this process, based on the Polish system, by Dr. E. R. Weidlein, technical consultant to the Rubber Reserve Co., indicated that it produces only 80% pure butadiene. He also said that the Carbide & Carbon Chemicals Corp., was allotted production "of 110,000 tons of butadiene (from alcohol) because I am convinced they are the only ones who know how to do it."

An inspection of the pilot plant established by Publicker in Philadelphia was made on July 10 by 16 members of Congress and representatives of four Federal agencies, including Rubber Coordinator Newhall. No comment on the inspection has been made up to this writing. According to a report prepared for the Army and Navy Munitions Board by a New York firm of chemical engineers after a two months' study of the company's process, issued on July 9, the Publicker process "will produce butadiene from alcohol in a single step with an alcohol conversion of 65 to 75 per cent." The process is said to yield almost 2½ pounds of butadiene from one gallon of alcohol. It also said that there are no unusual obstacles to complete utilization of the method in the nation's search for synthetic rubber.

Dr. William J. Hale, president of the National Agrol Co. and technical consultant to the Dow Chemical Co., again testified that grain was the answer to the synthetic rubber program. In a hearing held before a House mining subcommittee on June 25, Dr. Hale said that he could produce in a year all the rubber the nation needed if $100,000,000, the men and priorities were allowed to him. He said that he would set up about 100 plants, with two in each state, each turning out 45,000 pounds of butadiene daily from some types of corn. Another $150,000,000, he stated, would be required by the rubber industry to make the rubber from the butadiene, adding that the resulting synthetic would make tires superior to those now in use.

"We can produce rubber for probably 15 cents a pound from waxey maize and grain sorghums, and you can always make it cheaper as you progress," he said. "One hundred and fifty million bushels of corn will produce all the rubber we can possibly use, and that's not 5 per cent of our crop." Dr. Hale also testified that the petroleum industry had received $500,000,000 with which to make synthetic rubber, but that it could not hope to make more than 25,000 tons in a year and that no rubber as yet had been produced. He said that "we need only glass, porcelain, a little copper or silver—the fermentation takes place in wooden vats—yet we seem unable to get priorities."

Support to the rubber-from-grains industry was given by Dr. O. R. Sweeney, of the Iowa State College of Agriculture, who contended in testimony before the subcommittee on June 24 that "grain was the sole source available in enough quantities to meet the nation's rubber needs." He declared that from his experiments and other knowledge of synthetic rubber production, the use of alcohol was a cheaper process than butadiene from petroleum. He asserted that if we start immediately on producing alcohol from grain for conversion into butadiene "we will be able to produce enough rubber for our war needs" within one year. He also said that the grain process would solve the problems of farm surplus and expected post-war unemployment. Butadiene produced from alcohol, he said, is purer than when produced from petroleum.

HOUDRY PROCESS

A determined campaign to have the War Production Board adopt its process of producing butadiene from petroleum was launched by the Houdry Process Corp., of Wilmington, Delaware, and Philadelphia, Penna., in recent weeks. A series of full-page newspaper advertisements carried the story to the public. This process, the result of research in motor and aviation gasoline conducted by the company, has been previously referred to in these columns.

According to Eugene J. Houdry, president of the company, who developed catalytic processes now widely used for the production of petroleum products, the Houdry process for making butadiene from petroleum would save precious time and sufficient steel to build 100,000 jeeps. The process, he said, has been tested in a pilot plant which now turns out 40 tons a day and which has established characteristics of operation to be employed in commercial production. Although oil industry engineers have given enthusiastic approval to the process following months of study, an application recently made by the Sun Oil Co., a licensee, was turned down by Rubber Reserve with the explanation that further experimentation is necessary.

Asserting that he was not making any accusations against any Federal agency, Mr. Houdry said that Rubber Reserve's conclusion that the process was not sufficiently proved came after a two-hour conversation between him and an engineer sent by the government agency.

By contrast, he pointed to the fact that engineers of the Standard Oil Co. of California spent nearly three months of first hand study to the operations of the pilot plant.

According to Mr. Houdry, butadiene can be produced from petroleum with his process at a cost of 7 to 7½ cents a pound, compared with 10 to 15 cents a pound by other processes. His cost figures included provision for plant amortization within five years. Fifteen standard Houdry process plants, he said, can produce 750,000 tons of butadiene, sufficient for 1,000,000 tons of synthetic rubber. These plants could be built with one-third to one-half less steel than would be required in the plant construction of any other petroleum process, a saving in steel alone of 90,000 to 135,000 tons.

Mr. Houdry claimed that Houdry plants can be built in nine months, if given suitable priorities as to labor and material. This is at least four months sooner, he contended, than any other petroleum butadiene plant can be built and is substantially the same time required to build an alcohol butadiene plant. Each plant would cost approximately $12,000,000 to build, thus representing a substantial saving in the $700,000,000 allotted to date for the overall synthetic rubber program.

On July 6 Rubber Coordinator Newhall told reporters that WPB is giving close study to the Houdry process, stating that WPB was not yet prepared to say whether the process was better than others. He added, however, that if such proves to be the case the process can be incorporated into the plants now being erected under the synthetic rubber program. He subsequently stated that the process had been drastically changed in recent weeks and that the change would prolong the time needed for determining the effectiveness of the process.

Referring to Mr. Newhall's statement, Mr. Houdry said that it was probably due to some misunderstanding. "There has been no basic change in the principle of the process since it was first submitted to government agencies last April," Mr. Houdry stated. "At that time," he added, "we submitted data for a process that would produce butadiene more quickly, requiring less critical material, and at less cost than any other petroleum process. The process then submitted was ready to be incorporated into plants at that time."

Newhall Sees Cost Reduced

In a statement issued on July 5, Rubber Coordinator Newhall reported that with two plants in production (Firestone and Goodyear), government officials have discovered that making synthetic rubber under the government program will not cost as much as they thought it would. Mr. Newhall said that while money was no object in the 800,000-ton-a-year program, he was nevertheless pleased to report that the program would not require all the $650,000,000 which Congress authorized for it. In fact, he said, it may cost considerably less. Goodyear brought the first unit of the government-financed synthetic rubber plants into production in May and Firestone the second in June. U. S. Rubber's unit is expected to get into operation in August and the Goodrich unit in November.

Lowered cost estimates result largely from what WPB calls the "strip-teasing" of specifications, that is, the substitution of cheaper and more plentiful materials for steel plates, copper and other scarce metals in plant construction. Savings in the cost per ton are also accruing from mass production methods. Only 25,000 to 30,000 tons are expected this year, although a productive rate of 120,000 tons is expected to be reached by the year-end. Some 300,000 tons should be produced during 1943, and full capacity of 800,000 tons should be reached by the end of that year.

On July 8 the announcement was made by Jesse Jones that the RFC would advance financial aid for the construction of a Thiokol plant to produce approximately 40,000 tons of Thiokol a year. Practically the entire output of this plant will be earmarked for the recapping of civilian tires, according to reports from Washington. The special type of Thiokol suitable for such use was recently announced by the Dow Chemical Co., which produces Thiokol for the Thiokol Corporation of Trenton, N. J. It is understood that WPB has already assigned priority-guarded constructional materials for the proposed plant.

DATA ON POOLED PATENTS

Some interesting information on the pooling of synthetic rubber patents was revealed in a memorandum released by R. T. Haslam, vice-president of Standard Oil of N. J., on June 21. According to the memorandum, the pooling agreement, proposed by the Rubber Reserve Co. before Pearl Harbor (December 7) was concluded on December 19.

Rubber Reserve had under construction on December 7 four 10,000-ton defense plants, one each to be erected by Goodyear, Goodrich, Firestone and U. S. Rubber. Rubber to be made in these plants was to be of the butadiene-styrene or Buna S type. Details of the manufacture had not yet been settled, but Rubber Reserve believed the product would require a license under the Buna patents. The government agency, therefore, had been negotiating the exact terms of such a license for several months.

In October, 1941, the memorandum continues, the following terms were agreed upon: (1) No royalty was to be paid for the first year of operation of the government's program; (2) 1% was to be paid for the second year; (3) A minimum commercial royalty of 3% was to be paid—only if the program went beyond two years of actual production. In its commercial operations, Standard Oil had previously fixed a royalty scale of 5% of the sale price for the first 100,000 tons to be manufactured in the aggregate by all licensees, 4% for the second 100,000 tons, and 3% for the excess.

Goodyear and Goodrich, then making Chemigum and Ameripol, respectively, each had formulae which they believed superior to the one which Standard Oil had purchased from I. G. Farbenindustrie of Germany. Obviously, states the memorandum, Rubber Reserve wanted all four of its plants operated to the best advantage, with full licenses under all necessary patents, whether owned by Goodyear, Goodrich or Standard Oil. Rubber Reserve, therefore, proposed to the four rubber companies and to Standard Oil that some general agreement be arrived at which would result in an exchange of information between the operators of the four defense plants and Standard Oil in the use, in all plants, of all improvements by all the parties in all Buna type rubbers.

This proposal resulted in the arrangement of December 19 known as the "Pooling Agreement." All parties agreed to exchange of information and to cross licenses under their patents on the production of synthetic rubber based on butadiene. Since Standard Oil owned very broad patents on the Buna type rubbers, and Rubber Reserve was particularly interested in such rubbers, it was agreed that Standard Oil should receive, both on account of operations for the government and from the rubber companies on account of their private operations, royalties as follows: 1% of the sales price for four years and nine months (to government 1% of the sales price for duration of the national emergency); 2% of the sales price for the next four years and nine months; and no more royalties were to be payable after the expiration of this 9½ years. (The broadest patents expire in approximately 9½ years, and it was agreed that the licenses under all the other patents were to continue without payment).

General Agreement Considered

Reference is made in the memorandum to the fact that the advisability of making the Pooling Agreement a general one to include all synthetic rubbers was carefully considered during the negotiations but the idea was finally dropped as impractical. It was known at the time that there were at least two other types of synthetic rubber in which the government would be interested in if an emergency should arise, *i.e.*, neoprene and Butyl. Rubber Reserve had, in fact, already made an agreement with DuPont to take over for its own account a large neoprene plant DuPont was then constructing, and it was known that Standard Oil had a Butyl plant under construction. (Since the Pooling Agreement it has been learned that Thiokol can be used for retreading tires and Rubber Reserve will finance construction for greatly expanded output).

Neoprene, Butyl and Thiokol, con-

tinues the memorandum, were not, then, included within the pooling program, and to date each of these products is manufactured only by its originator because (a) no one else has any experience in its production, and (b) the Rubber Reserve's own major program, to be participated in by the whole rubber industry, was limited to the Buna type rubbers.

Consent Decree Changed Picture

The consent decree entered into between the government and Standard Oil on March 25 changed the above picture slightly. Under the terms of the decree Standard Oil agreed that it would charge no royalty on the Buna patents for the period of the war, either for government or for private operation, and that it would license the patents to anyone after the war for reasonable royalty rates. The only practical effect of this, the memorandum points out, was that Standard Oil waived, for the period of the war, the royalty of 1% of the sales price of rubber (about 2 to 2½c on an ordinary automobile tire) which the parties to the Pooling Agreement had agreed upon. Nothing else of consequence was changed, since Standard Oil had already fixed a post-war royalty for the government itself and the parties to the Pooling Agreement.

Under the consent decree, Standard Oil's obligations concerning Butyl rubber were materially less than those already self-imposed by the company's voluntary offer of March 10, when it announced that it was willing to license anyone for the production of Butyl during the war without royalty and after the war at reasonable royalties to be fixed by government authorities. The voluntary offer included all Butyl patents, but under the terms of the decree Standard Oil obligated itself to license royalty-free during the war only such Butyl rubber inventions as had already been actually patented before the date of the decree.

In concluding, the memorandum states that Standard Oil has stood ready and willing to license anyone under both the Buna and Butyl patents. Actually, however, there have been no licenses in either case because the entire requirements of the country, so far as government officials are willing to permit the diversion of material to the manufacture of rubber plants, are covered by the projects which Rubber Reserve has already worked out.

These projects include 700,000 tons of Buna type rubbers to be made by the four leading rubber companies as parties to the Pooling Agreement; 40,000 tons of neoprene to be made by DuPont, completely outside of the Pooling Agreement; 60,000 tons of Butyl to be made by Standard Oil and Humble Oil & Refining Co., also outside of the Pooling Agreement. (EDITOR'S NOTE: Humble Oil is already building a plant.)

Ten suits by stockholders of the Standard Oil Co. (N. J.) for recovery of losses allegedly suffered by the company through its pre-war agreements with I. G. Farbenindustrie were disclosed in the New York Supreme Court last month when the defendants moved to consolidate all the actions into one. The losses were estimated in some of the complaints as amounting to more than $100,000,000. The suits, based on disclosures made in testimony before the Senate's Truman Committee, named as defendants six corporations and thirty-six present and former officers and directors. The Standard Oil management was given an overwhelming vote of confidence in regard to its relations with the German chemical trust at a stockholders' meeting held early in June.

The charge that Thurman Arnold, of the Department of Justice, either ignorantly or deliberately misled Congress and the public in connection with patents and industry's war production was made by George E. Folk, patent adviser, in a report released by the National Association of Manufacturers on July 8. Despite Mr. Arnold's allegations that patents have held up the war program, the government, Mr. Folk pointed out, has long had the power to have anything produced for it at any time, in war or peace, regardless of patents.

"The simple truth," Mr. Folk added, "is that the government could have had plants built to produce synthetic rubber, aluminum, magnesium, optical instruments, chemicals, or anything else it wanted, and it could have used the processes covered by anybody's patent. No patent holder, if he had tried, could have stopped the government from using his patented inventions in any kind of industrial expansion for government purposes."

To Organize Oil Industry

A program to organize the nation's oil industry for the production of raw materials needed for the manufacture of synthetic rubber was announced in Washington on June 15 by Ralph K. Davies, Deputy Petroleum Coordinator. Definite action on the program awaits the completion of a survey now being made to determine the industry's capacity to produce such raw materials without impairing the production of other needed materials. The survey is being conducted under Petroleum Directive No. 52, issued to the petroleum refining industry and the industry committees by Mr. Davies on June 10. It is being made by the Petroleum Industry War Council.

The directive calls for reports that will show the progress being made in the survey. Whenever the investigation has progressed sufficiently, plans for the production of raw materials for synthetic rubber may be submitted to the director of refining for the approval of the Office of the Petroleum Coordinator. If the production plan is found acceptable, negotiations will be conducted between the OPC and the company submitting it, leading to agreements for the production and sale of the raw materials.

Substitutes from Farm Products

Additional information has come to light regarding experiments being conducted at the Northern Regional Research Laboratory of the Bureau of Agricultural Chemistry and Engineering at Peoria, Ill., to develop so-called rubber substitutes and rubber extenders from such farm products as soybean oil and corn oil. According to a report issued on July 2 by the Department of Agriculture, some of the materials produced to date from these products look, smell and feel like natural rubber.

Some of these products, the report states, will stretch 200% or more and return to their original forms, and show tensile strengths of approximately 500 pounds per square inch. The general run of natural rubber has a 600% elongation and a tensile strength of 3,000 pounds per square inch and more. But Bureau chemists point out that a substitute that is only a fraction as strong and elastic is entitled to be called "promising" for some purposes.

There are other important qualities than stretch and tensile strength, these chemists point out, their importance depending on the intended use. Some of these other qualities are resistance to abrasion, cracking, oxidation, heat, and the effects of light and chemicals. Most of the work so far has been only on a laboratory scale, but some of it is now being tested in the pilot plant. If these tests prove satisfactory, the next step would be commercial trials.

CONTINUED PROGRESS REPORTED IN CRUDE RUBBER DEVELOPMENTS

Encouraging reports on crude rubber developments in Latin American countries continue, although it is far too early to make any predictions concerning the amount of rubber which may be forthcoming in the near future. Vast quantities of materials are needed to push the various programs launched. In this connection, a statement issued late last month by the Office of the Coordinator of Inter-American Affairs, Washington, D. C., is of special interest. The statement in full follows herewith:

United States government agencies in collaboration with the other Americas are planning for one of the biggest equipment tasks of the war—the outfitting of thousands of rubber tappers to collect wild rubber in the forests of South and Central America. Several of the other American republics are mobilizing large numbers of rubber tappers to enter the forests and obtaining equip-

ment for them provides a supply problem comparable to the tasks of military quartermasters.

Officials studying rubber equipment needs, for instance, estimate 100,000,000 tapping cups may be required. In addition, thousands of machetes will be required, also knives, shotguns, sieves, spouts, wringers, files to sharpen tools and other paraphernalia.

Equipment Task Tremendous

Dr. Earl N. Bressman, Director of the Agricultural Division of the Office of Inter-American Affairs, recently told a United States Senate Committee that a preliminary equipment order from Brazil included 5,000 tapping cups, 5,000 machetes, 10,000 files, 5,000 shotguns, 250,000 shotgun shells and 5,000,000 atebrine tablets for combating malaria. This order, he noted, was instructive because it indicated the scope of the equipment task and the variety of things that must be procured for the men who go into the forests.

Many of these rubber tappers must be equipped to travel as virtually self-sustaining production units. Before they get to a tree that might yield latex, they must have machetes to hack their way through jungles, shotguns and fishhooks to obtain food. After the latex flow starts, they need more equipment to prepare rubber for shipment.

Before the rubber tapper starts for the producing areas, moreover, there is a transportation job. This includes procurement of boats and barges, to transport workers and bring out the rubber after it has been collected. The main avenue of transportation into the vast Amazon basin, with its estimated 300,000,000 wild rubber trees, is the great river itself and its navigable tributaries.

Just how equipment will be distributed to tappers remains to be decided in detail. Right now the concern of government agencies is to get the equipment. This is no simple matter. Concentration of United States war industry on war production has reduced manufacturing capacity for other work. Metals largely have been diverted to war use.

Rubber is so vital to war needs, however, that equipment for the tapper is expected to rate high for preference. As one way around the metal shortage, an effort is being made to produce a satisfactory tapping cup out of plastics.

Some 40,000 rubber tappers are estimated to be at work now in the Amazon basin. Officials hope to get another 20,000 equipped this year. How many additional tappers join the rubber army after that depends on how fast equipment can be procured and organizational plans completed.

United States authorities hope to arrange for production in Brazil and other rubber-producing countries of much of the needed equipment. This will help relieve already overwhelming demand upon United States manufacturing industry. At the same time, locally manufactured equipment would help build the rubber industry in those countries.

The United States is giving financial and technical aid to rubber production in the other Americas. Agreements for purchase of rubber export surpluses already have been made with Brazil, Peru and Nicaragua. Negotiations have been under way with other rubber-producing countries of the hemisphere.

The United States has agreed to contribute $5,000,000 toward rubber development in Brazil and $1,125,000 to Peru. Similar financial aid, it is indicated, may be forthcoming for other American Republics joining in this vast rubber program. Aside from direct aid, additional millions of dollars are to go into health and sanitation projects to protect workers engaged in production of rubber and other strategic materials.

Execution of the plans for large-scale production of rubber would bring to the Americas one of the greatest economic developments in the history of the hemisphere.

J. W. Bicknell, testifying in a recent Senate hearing, gave a glimpse of the breadth of the work. Mr. Bicknell, Vice-President of the Rubber Reserve Corporation, principal United States buying agency for rubber, said the program would involve roads to open up inaccessible areas, boats and barges on rivers, air fields, movement of workers to rubber-producing areas, health and sanitation projects, development of local food sources, supplying of tapping implements, building materials and medicine.

The Amazon basin is a territory of heroic size for development. Its 2,500,000 square miles are perhaps the world's largest area of unexploited riches. Now its most urgently sought wealth is rubber. Rubber technicians estimate the Amazon basin could yield as much as 750,000 tons of rubber annually—almost enough to cover the record-breaking consumption of rubber in the United States last year. But collection of rubber in the Amazon on that scale would require immense organizational task. It would involve migration of tens of thousands of workers into the area, difficult problems of transportation, sanitation, housing.

At the foundation of the organizing job is the tapper. Tappers must be found in sufficient numbers, and be properly equipped. The Americas are tackling these problems. The rubber-tapping army, consequently, may take form as one of the greatest organizational achievements of this war.

Plan Post-War Maintenance

Rubber men look forward to post-war maintenance of the tapping army. Many contend that with sufficient organization and improved equipment, the new contingents of tappers could hold their own in the market place for a long time after the war—at least until plantation systems are developed in the Americas to supplement wild forests.

In certain areas of the Amazon, several rubber trees to an acre may be found. But, generally, wild rubber trees are too scattered for competition with rubber produced from close-spaced trees of a plantation. The wild forest requires more tappers. This manpower problem is the key to the rubber procurement task in the Americas. It is illustrated in the preparations to obtain equipment for thousands of additional tappers to launch the biggest hunt this hemisphere has seen.

Additional Sources Assured

The latest Latin American countries to enter into agreements with the Rubber Reserve Co. for their sale of crude rubber were Costa Rica and Colombia. Signing of the agreement with Costa Rica was announced on June 16 and that with Colombia on July 2. Like the agreements signed with Brazil, Peru and Nicaragua, those with Costa Rica and Colombia provide that Rubber Reserve will buy all rubber produced in those countries for the next five years over and above that required for the needs of the respective countries. The necessary funds to aid in the development of the rubber resources of both countries will be provided by the Reconstruction Finance Corp. Colombia will receive a loan of $1,000,000.

On June 24 it was announced at Bogota, that the Colombian Government had issued a decree creating an official monopoly for the exploitation and exportation of rubber produced in that country. The Agrarian Credit Bank was designated as the sole agency authorized to buy and sell crude rubber.

According to reports from Bolivia, Argentina and Uruguay are contesting the bid of the United States for purchase of that country's exportable rubber. Argentina, it is reported, wants the entire annual output of 1,200 tons, offering to return 30% of the amount in manufactured articles. Uruguay is understood to have made an offer for 600 tons. The decision may rest on negotiations now being conducted in Washington by representatives of the Bolivian government.

Word was received from Managua on June 14 to the effect that the National Bank of Nicaragua has established ten agencies throughout the country to purchase rubber at an average price of 26c a pound. Most of the rubber trees in Nicaragua have not been tapped for twenty years or more and accordingly a fairly large yield is anticipated. Some of these old trees are reported to be 12 to 18 inches in diameter.

The statement that Brazil has no future as a rubber producing center, present war needs and future development notwithstanding, was made by Dr. A. A. Bitancourt, director of the Biological Institute of Sao Paulo. The statement was made on June 17 at Salt Lake City where Dr. Bitancourt was attending a meeting of the Pacific Division of the American Association for the Advancement of Science. He pointed out that because of the small population in the rubber producing areas of Brazil there

is no cheap labor supply and expressed the opinion that approximately 60,000 tons a year would be the maximum the country could produce.

The Rubber Reserve Co. is known to be giving very careful attention to reports on possible Brazilian production made by R. B. Bogardus, manager of the crude rubber purchasing department of Goodyear, and James Roberts, chief of rubber purchasing for Firestone. Both men recently returned from personal surveys of Brazilian rubber areas. It is believed that both ventured deep into the upper regions of the Amazon. Both surveys were made for Rubber Reserve.

Confirming the opinion of qualified crude rubber experts, the Department of Agriculture announced on July 9 that its plant specialists and engineers have concluded after many months of intense investigation and experimenting that there is no quick, easy source of natural rubber to replace supplies cut off by the war. Departmental studies have been directed at such rubber-producing plants as guayule, *cryptostegia, Kok-Sagyz,* goldenrod and rabbit brush.

In the opinion of the Department's rubber specialists, guayule remains the most promising of all plants investigated to date. Loren G. Polhamus, senior agronomist of the Bureau of Plant Industry, however, again emphasized that substantial yields of guayule cannot be expected in the immediate future, pointing out that at least 600,000 acres would be required to provide a sixth of the nation's normal needs.

The suggestion that newly-devised Diesel-engined amphibian carrier boats, similar to those employed in Africa and other overseas battlefronts, be used to transport rubber from the heart of the South American jungles has been advanced by the Andrew J. Higgins Co., of New Orleans, builders of torpedo boats and invasion barges. With these specially-designed combination ship-trucks, which can operate in shallow water, climb over rocks, and drive along banks, the company believes it can transport rubber from such countries as Venezuela to New York at reasonable cost.

The Higgins boat-trucks cost from $10,000 to $70,000 and weigh from 10 tons up. According to Dudley P. South, research engineer of the company, who recently returned from Puerto Ayacucho, by using the Orinoco, the Rio Negro and the Amazon, the new boats can travel to Trinidad and to the Brazilian city of Manaos on inland waterways, saving some 2,000 miles of travel. Because of their long range, the boats can travel in sections of the Amazon basin where white men have never been able to venture.

Designed after the fashion of tank carriers, the new river craft will not be daunted by rapids, according to the Higgins company. Where long overland portage is necessary, the merchandise can be carried on trucks aboard the boats. The company is understood to be negotiating with the Venezuelan government for the use of the special amphibian carrier boats.

NEW PRICE CEILING COVERS SCRAP RUBBER OF ALL KINDS

As expected, Price Administrator Leon Henderson has acted to bring prices to consumers for all kinds of scrap rubber into line with the maximums previously established on tires, tire parts and tubes. On June 27 Mr. Henderson announced the issuance of Revised Price Schedule No. 87, as Amended, on scrap rubber. In announcing the new schedule, which brings all types of scrap under ceilings, the Administrator emphasized the point that the ceiling order in no way affects either Rubber Reserve Company's offer to buy scrap tires and miscellaneous scrap rubber at $25.00 a ton in carload lots at any shipping point in the country or the price paid to individuals by filling stations and other collection agents in the national campaign. The complete schedule is reproduced on page 305 of this issue. A full explanation of the procedure followed in drawing up the new schedule is included.

In drawing up the new schedule of maximum prices to consumers, OPA took into consideration Rubber Reserve's offer to buy scrap at any shipping point for $25.00 per ton. The effect of this offer and the amended price schedule, considered together, is believed to assure to scrap sellers a ready and remunerative market and at the same time to stabilize the raw material cost of reclaimers. With scrap now salable at all points of shipment, the collector is relieved of the shipping expense which in many cases was prohibitive of sales.

The new amendment puts 28 additional kinds of scrap rubber under the schedule, in addition to tires, tire parts and tubes. In amending the schedule, OPA withdrew a previous provision of the order which permitted a consumer to pay, in addition to the listed ceiling prices for scrap tires, the actual freight charges in excess of $8.00 a ton. Now that there is a remunerative market for scrap at all shipping points there is no longer need for the extra freight charge provision to encourage collection. The premium for large deliveries likewise has been withdrawn.

Three new classifications have been added to the list of tire scrap items that are under price ceilings. On these items, as on other descriptions of scrap tires, tire parts and tubes, the maximum levels differ among several consuming centers. However, on all other scrap rubber items put under ceilings in the amended schedule, there is only one price for each grade at all delivery points.

A few days after the issuance of the amended revised price schedule on scrap rubber OPA added another category—Miscellaneous Inner Tubes—to the kinds of scrap under price ceilings applicable to sales to consumers. The additional classification was incorporated in Amendment No. 1 to the revised schedule. The maximum price for the new classification is 5½c a pound at Los Angeles and 6c a pound at all other consuming centers.

According to OPA, the flow of inner tubes to the Rubber Reserve Co. has been so heavy that it was feared the time needed for sorting into the customary classifications as set forth in Table II of the Revised Price Schedule might cause delay in delivering scrap to reclaiming plants. For this reason the new category was added. Consumers can continue to obtain the classifications set forth in the revised schedule, but those needing scrap inner tubes immediately can now obtain them unsorted.

Scrap Rubber Agents Named

Earlier in the month—on June 22—it was learned that the Rubber Reserve Company had appointed four scrap rubber dealers as its agents. These dealers are H. Muehlstein & Co., Inc., Nat E. Berzen, Inc., A. Schulman, Inc., and the Loewenthal Co. These four agents will purchase scrap rubber from collecting dealers for the account of Rubber Reserve and will direct deliveries of sorted and otherwise suitable shipments to reclaiming plants. Unsorted deliveries, particularly those resulting from the national scrap rubber collection drive, will be made to the warehouses of the agents for sorting and grading. All four agents have branches in various consuming centers. They will work for the government corporation on a commission arrangement, believed to be $1.50 per ton.

The basic price of $25.00 per ton in carload lots now being paid by Rubber Reserve applies to standard mixed automobile tires and miscellaneous scrap rubber, anywhere in the United States. Standard beadless tires are currently being bought for $31.50 per ton, but it is understood that this price will also drop to the $25.00-per ton figure shortly. Tire beads now bring $3.50 per ton while inner tubes are being purchased at 6c per pound. These are prices paid to dealers by the Rubber Reserve agents.

In the future virtually all scrap rubber will flow through government channels and it is of course hoped that the higher prices to be paid to dealers will stimulate collections. The efforts of dealers, however, have been seriously interfered with as a result of the national collection drive and it may be some time before increased supplies will be forthcoming from such channels. The difference between Rubber Reserve's purchasing price and the new OPA ceilings will naturally be borne by the government.

In discussing the higher prices established for scrap rubber and the national collection effort through the filling sta-

tions of the nation, Dr. Joseph E. Pogue, chairman of the rubber subcommittee of the Advisory Committee on Economics of the Petroleum Industry War Council, in a recent talk given at Lexington, Kentucky, before the Interstate Oil Compact Commission, stated that these movements were but two of four necessary means to marshall scrap rubber resources. He suggested that an additional incentive for scrapping tires should be established by issuing negotiable priority certificates for recaps and that the return flow of scrap from military and foreign sources should be organized by the government.

Charges Scoring of Rubber Plans

Charges that WPB officials are balking construction of new rubber reclaiming plants were made before the Senate agricultural subcommittee on June 19. Harold S. Sims, of Fort Worth, Texas, testified that Rubber Coordinator Newhall told him present facilities for processing scrap rubber could produce 270,000 tons annually and that available scrap would permit no greater production. He said that he had recently gone to Washington with plans for a new rubber reclaiming plant, was referred to Dr. Harry S. Rogers, chief of the Rubber Branch of WPB, and that Dr. Rogers ridiculed the plans.

According to Mr. Sims, who recently formed the Southwest Rubber Reclaiming Co. at Fort Worth, Dr. Rogers told him that "there are just three or four real rubber engineers in the country and I know three of them personally. You should go to one of these and let him prepare your brochure. It will cost you $50,000, but when it is done, I'll be able to understand it." Mr. Sims also charged that at that point J. H. Davidson, a WPB industrial specialist, offered to redraw the plans for $25,000. Mr. Sims, according to his testimony, went back to see Mr. Newhall and was told not to worry about the $50,000, because it could be added to an RFC loan.

In testimony before the same subcommittee on July 6, Dr. Rogers testified that he had merely told Mr. Sims as a matter of information that his plans were "inadequate and incomplete" and estimated that it would take about $50,000 to redraft them. Dr. Rogers appeared before the committee after Mr. Nelson had insisted that the committee give ear to a rebuttal of the charges raised by Mr. Sims.

At an earlier hearing—that on June 19—Senator Gillette read into the record testimony indicating that many of the government's rubber advisers are connected with the "big four." Mr. Newhall had previously testified that final rubber authority was vested in a group of experts. These experts, according to a list secured from Jesse Jones, head of the RFC, include the following: Dr. E. R. Weidlein, now acting as technical consultant to the Rubber Reserve Co., R. P. Dinsmore (Goodyear), P. K. Frolich (Standard Oil), J. N. Street (Firestone), M. H. Boyd (Hycar Chemical), W. L. Semon (Goodrich), W. A. Gibbons (U. S. Rubber), S. T. Crossland, assistant to the president of Rubber Reserve, and F. H. Carman, chief of the Synthetic Rubber Branch, WPB.

INCREASED JULY TIRE QUOTA REFLECTS NORMAL SEASONAL FACTORS

Reflecting normal seasonal factors and increasing employment of workers in war occupations which make them eligible for tires under rationing regulations, a larger tire and tube quota for July than June was announced by OPA on June 28. A quota of new Grade II tires—third, fourth and fifth lines—was set up for war workers whose casings are unfit for recapping, the first quota of new tires of any kind for List B eligibles. This eligibility was set up by Amendment No. 16 to the Revised Tire Rationing Regulations, issued on June 19. (See below).

The July passenger car tire quota includes 57,097 new tires for List A eligibles, 23,402 new Grade II tires, 555,077 recaps, and 323,087 inner tubes, which compares with the June quota of 49,584 new tires, 479,051 recaps, and 265,007 tubes. There were no Grade II tires provided for war workers in June.

Truck tire quotas for July provide more new tires than were allotted for June, but show a deduction in the number of recaps and tubes made available. The quota for new truck tires is 268,925, compared with 247,715 for June, while the recap quota is 314,896 against 365,014, and the tube quota is 299,265 against 309,116.

Except for the new Grade II tires, set up in a separate category for qualified war workers, all the new tires in the July quota are available only for use on vehicles eligible under List A. On the recaps, too, the List A users have first call over applicants eligible under List B, which covers vehicles operated in essential services but of secondary importance to those included in List A.

Maxima prices for "special purpose" used inner tubes higher than those applicable to ordinary used tubes have been established through the issuance of Amendment No. 3 to Maximum Price Regulation No. 107, effective July 11. The amendment sets forth the brand names and the schedule of ceiling prices for the special purpose tubes generally described by the terms "double-walled," "puncture-sealing," "self-sealing," and others. Prices for passenger car and truck sizes are set at levels about 50% of the average list prices of these tubes when new and substantially above the maxima prices for used ordinary tubes. A used 6:00-16 special purpose tube, for instance, may be sold for $5.45, compared with $1.50 for the ordinary passenger car tube and $2.00 for a truck tube of the same size.

Companies specifically named in the amendment, with the brand names of their special purpose tubes shown between parenthesis, follow: Firestone (Puncture-Proof, Life Protectors), General Tire (Puncture-Proof, Retain-air), Goodrich (Seal-O-Matic, Air Continer, Quick-Seal), Goodyear (Puncture Seal, LifeGuards), Kelly-Springfield (Air-Core), Polson Rubber (Puncture-Sealing), Seiberling (Sealed-Air), and U. S. Rubber (Master Seal).

OPA Denies Price Changes

A request by Pennsylvania Rubber Co., Jeannette, Penna., for permission to establish ceiling prices on original tires and tubes at a level higher than that provided in Price Schedule 119 was denied by OPA on July 2. Pennsylvania Rubber had asked for a price ceiling 5% above its published original equipment price list effective December 31, 1941, instead of 5% above the highest price charged by it for equipment of the same kind during 1941, as is provided in the regulation.

In its petition, Pennsylvania Rubber said that its 1941 prices were not representative as they applied to what was then an inconsiderable portion of its total business. This year, however, original equipment has come to represent a materially larger share of total sales. The company asked for an exception to the regulation under a section providing for adjustment in the case of high-cost producers. OPA denied the petition because "there was no showing that the company's production costs are high in comparison with the average operating cost in the industry."

A protest by U. S. Rubber against the maximum retail prices established for its two extra-quality tires—the U. S. Royal Master and the Fisk Safti-Flight—was dismissed on July 8 by OPA. The protest was dismissed on the grounds that it had not been made within 60 days after the effective date of Revised Price Schedule No. 63 which sets retail ceiling prices for tires of premium grades. As a second ground for dismissal, it was stated that U. S. Rubber, a manufacturer, was not subject to the regulation, which applies only to retail sales. In dismissing the protest, however, OPA said that it would treat it as a petition for amendment of the revised price schedule.

Eight Additional Amendments

Since our last issue OPA has issued eight additional amendments to the Revised Tire Rationing Regulations, as follows:

Amendment No. 13, issued on June 15, permits the sale of five-ply tires to any holder of a certificate for a four-ply casing. Heretofore, the sale of five-ply

tires was restricted to special uses. This amendment was adopted to broaden the market for the five-ply tires in dealers', distributors' and manufacturers' inventories.

Amendment No. 14, issued June 17 and effective June 22, clarifies the procedure by which owners of tires or tubes in public warehouses may withdraw them for their own use by presentation of a rationing certificate. This action formalizes a procedure which previously had been permitted under an interpretation of the regulations by OPA attorneys. It was stressed, however, that these tires or tubes may be withdrawn only for use on eligible vehicles.

Under Amendment No. 15, vehicles operated principally for official use by heads of foreign diplomatic missions formally accredited to this country have been made eligible for tires. Under the amendment, issued on June 17 and effective June 22, eligibility is also extended to foreign government employees engaged in functions essential to the war effort under a section of the regulations which heretofore has applied only to our own Federal, state and local government employees. The diplomats come under List A and foreign government employees under List B.

Amendment No. 16 makes war workers eligible for Grade II tires—third, fourth and fifth line new tires—under certain restrictive conditions and simultaneously provides a system designed to make each tire deliver the utmost in essential transportation. The amendment, issued on June 19, sets up a procedure under which an employee of an establishment essential to the war effort and employing more than 100 workers must present to his local rationing board a statement from a committee set up in his own plant showing that he needs tires and has agreed to make maximum use of them in carrying other employees to and from work. Certificates for Grade II tires will be granted to workers whose eligibility is thus established when the casings on his car are unfit for recapping. War workers heretofore have been eligible only for recaps or recapping services. Grade II tires are described as those which have a maximum price of less than 88½% of the ceiling level for first line tires as established in Price Schedule No. 63, revised. The amendment was effective July 15. (EDITOR'S NOTE: See Amendment No. 20, below).

Amendment No. 17, issued on June 27 and effective July 2, tightens requirements in some respects and extends eligibility for tires to certain vehicle users heretofore not provided for. The amendment requires that a vehicle operated by a physician, surgeon, farm veterinary or practicing minister, to be eligible for tires and tubes, must be used "exclusively" for professional services or religious duties instead of "principally" as heretofore; makes licensed chiropractors and osteopaths eligible under the same conditions as apply to doctors of medicine; extends the eligibility of ministers to "any religious practitioner qualified to administer to the religious needs of the members of a congregation"; changes the designation of nurses eligible for tires from "visiting nurse" to "public health nurse"; and extends eligibility for recapped or obsolete new tires to public school officials and teachers for necessary transportation between schools.

Amendment No. 18, issued on June 30, requires tire sellers of all kinds—tire dealers, automobile supply companies, motor vehicle dealers and automobile finance companies—to file reports on their inventories of all serviceable tires—new, used, retreaded and recapped—as of June 30, as well as quarterly thereafter. The reports are to show each seller's stocks of passenger car and truck tires and tubes, tractor and farm equipment tires, and all other tires of whatever kind, not mounted on a vehicle. Used tires as well as new are to be shown on special forms provided by OPA if they are usable in their present condition or as basic tire carcasses for recapping if they can be made serviceable by repair. The reports must be filed with local rationing boards on the due dates—the 15th of July, October, January and April.

Amendment No. 19, issued on July 8 and effective July 15, enables purchasers of new and rebuilt tractors, farm implements and other vehicles that are sold without tires to obtain casings and tubes. Until changed by this amendment, the regulations made provision for issuances of certificates for replacements and spares only. Local rationing boards are now authorized to issue original equipment certificates when the buyer of new or rebuilt vehicles to be put into eligible use submits an affidavit from the seller setting forth a satisfactory reason for delivery without tires and tubes. It was emphasized that mere changeover from steel wheels to wheels requiring rubber tires does not constitute "rebuilding."

Amendment No. 20, issued on July 8 and effective July 15, makes it plain that only third, forth and fifth line new tires will be available to war plant workers who get certificates entitling them to buy Grade II tires. The amendment redefines Grade II tires as those which have a maximum price of less than 85% of the maximum for first line tires as established in OPA's Revised Price Schedule No. 63. The original definition (see Amendment No. 16 above) included all tires under 88½% of the first line ceiling, a definition that was subsequently found to include a number of brands that are considered to be second line tires by the trade.

ADDITIONAL TIRE ORDERS

The issuance of Supplementary Order No. 6 by OPA on June 19 gives sellers whose ceilings are set under certain maximum price regulations, including Price Schedules Nos. 63 (new tires and tubes), 66 (retreads and recaps, retreading and recapping, and basic tire carcasses), and 107 (used tires and tubes), the option of continuing the type of posting of prices set forth in those specific price regulations or of using any of the posting methods permitted under the General Maximum Price Regulation. The specific commodity regulations require the seller to display ceiling prices with a sign or placard at the place of sale. Such posting is also allowed by the general order, but the latter requires the use of specific language not called for in the individual commodity regulations.

Through the issuance of Supplementary Order No. M-15-d by WPB on June 12 persons buying new airplane tires and tubes must now obtain a certificate stating the necessity of the purchase. The certificate must be secured from a Safety Regulation Inspector of the Civil Aeronautics Administration and must state that the tire is necessary to maintain the aircraft in an airworthy condition. The purchaser is also required to turn in the old tire. The order contains various exceptions in favor of the Army and Navy, foreign countries, air carriers, and other persons (in accordance with the WPB definition of "persons") who may be specifically authorized to purchase tires by the Director of Industry Operations.

Steps to save rubber now being wasted by ignorance of tire care and by deliberate abuse are being taken by OPA. Inspectors who examine tires as a part of the procedure followed by applicants for rationing certificates have been given a set of instructions to help them in determining when a tire is repairable and recappable and when it has been neglected or abused, according to an announcement on July 9. This action is intended to give force to a provision in the Revised Tire Rationing Regulations that permits local rationing boards to refuse tires to any who have abused those they already have or who have driven them beyond the point were recapping is practical.

Recent OPA Interpretations

Recent interpretations of provisions within the price regulations issued by OPA included the following:

The phrase "new rubber" appears in Price Schedule No. 66, which covers retreaded and recapped tires, retreading and recapping of tires, and basic tire carcasses. Since the phrase "new rubber" as used in the schedule means rubber which is newly applied to the particular tire, including reclaimed rubber so applied, the schedule covers retreading with treading stock made wholly of reclaimed rubber.

Inasmuch as Maximum Price Regulation No. 107, covering used tires and tubes, is applicable to all inner tubes, it has been determined that the schedule is applicable to LifeGuard tubes, made by Goodyear, which are special purpose inner tubes with a high quality construction. Under the same regulation, a six-ply passenger car tire to be mounted on a truck is classified as a passenger car

tire since the tire must be recognized as a truck tire by the trade before it may be classed as such.

Two additional interpretations of this regulation are: (1) A filling station operator who requires as a condition to selling his better tubes that the buyer also purchase oil violates the schedule by the tying agreement; (2) Despite a prevailing custom in the trade, it is a violation of the schedule to offer tires for sale only in connection with the sale of other articles, such as tubes or wheels.

MISCELLANEOUS REGULATIONS

Maximum specifications for heat-resistant alloys used in synthetic rubber plants, metallurgical furnaces, cement mill furnaces, and power plant equipment, are set up in Supplementary Order No. M-21-g, issued by WPB on July 3. The new specifications are designed to use the least possible amount of alloying materials necessary to maintain the effectiveness of the equipment involved. Savings in nickel are expected to be in excess of 10% of the annual consumption of the metal.

Conservation Order No. M-81, issued by WPB on June 27, prohibits the manufacture or use of tinplate or terneplate cans for many chemicals, paints, and other "special products." Included in the latter category were rubber, linoleum and radiator cements.

The maximum price for leaded zinc oxides containing 35% or more lead has been restored to the April 1 level of 7c a pound through the issuance of Maximum Price Regulation No. 166 by OPA on June 17. In issuing the regulation, OPA explained that under the General Maximum Price Regulation an inadvertent omission had cut the price back to 6.75c a pound, a figure which failed to compensate producers for increased costs. OPA had previously approved a 7c a pound figure. There is little leaded zinc oxide used in the rubber industry. Although originally the effective date of the order was set at June 22 it was later made retroactive to May 11.

Butadiene Under Allocation

Expanding its control over raw materials used in the manufacture of synthetic rubber and other essential war materials, WPB placed butadiene, basic ingredient in the manufacture of the Buna type rubbers, under allocation with the issuance of General Preference Order No. M-178, effective July 1. Producers seeking to deliver and persons asking delivery of butadiene are required to make application to the Director of Industry Operations. They are requested to use Form PD-33, which covers the production and shipment of all chemicals used in the manufacture of synthetic rubber. Producers who make less than five tons of butadiene per month are excepted from the provisions of the order.

New Lifesaving Devices

Two new lifesaving devices made of cellular rubber, which has twice the buoyancy of cork, have been developed by the U. S. Rubber Co. One is a spider-like network of discs of cellular rubber strung together with ropes and the other is a self-lighting electric lamp which will float in the water beside victims of a sinking ship to guide rescuers at night. The raft will support up to 30 persons. It can be thrown overboard from ships when there is no time to launch a regular lifeboat or raft, especially in the case of torpedoed boats, and is so constructed that it may be easily grasped in the water. Both of the new devices are being manufactured by the Sculler Safety Corp., New York City.

Synthetic Rubber Oil Tank

A partial answer to the oil transportation problem is believed found in a synthetic rubber container developed by the Glenn L. Martin Co., airplane manufacturers of Baltimore, Md. The container is based on the same principle as the Mareng Cell, the self-sealing, leakproof gasoline tank used in military planes developed by the company. It is expected that the new product will conserve space, since when empty it can be rolled up into compact packages and sent back in a minimum of space, making the car, barge or truck available for other freight. Service is said to represent no problem beyond the ability to apply a cold patch in case of any rupture of the material.

General Dyestuff Under Control

Leo T. Crowley, Alien Property Custodian, announced on July 3 that his office had taken over control of the General Dyestuff Corp., selling agency for the General Aniline and Film Corp. Control of the latter company was vested by the Alien Property Custodian some two months ago. With assets of $6,000,000, General Dyestuff's sales in 1941 exceeded $22,000,000. General Dyestuff sells colors and other materials to the rubber industry.

Handle Neutralizer Sales Direct

Sales and installations of the Chapman Electric Neutralizer, heretofore handled by the Kidder Press Co., Dover, N. H., as agents, will in the future be handled direct by the Chapman Electric Neutralizer Co., Portland, Maine. Installation engineers formerly associated with Kidder Press are now working with the Chapman concern.

BRITAIN TRACES DERMATITIS TO RUBBER USED IN GAS MASKS

Skin eruptions that in several case. assumed a serious condition are being caused by the use of gas masks in test exercises at a naval station, according to a report in a recent issue of a British medical journal published in London.

Submitted by Surgeon Lieut. Comdr. J. Petro, formerly of the skin department of St. George's Hospital in London, the report declared that the dermatitis was traced to compounds used in curing and vulcanizing rubber. This was supported by an inquiry that showed that of sixteen cases developing out of hundreds of masks in use all occurred among persons wearing the masks of two manufacturers.

As to what compounds were found to be specifically harmful a curtain was drawn after the service departments had made a ruling it would not be permitted to make them public. These masks, however, were found to be causing the skin disturbance after being used three to fifteen times for fifteen-minute periods a week apart. In other words, weekly gas drill, which normally requires wearing a mask about fifteen minutes, is sufficient to cause eruptions in three to fifteen weeks.

It occurred first as a mild, burning sensation of skin areas that had been in direct contact with the mask, followed by intense irritation, an inflammatory condition, swelling and finally a skin condition resembling that caused by impetigo. It was found that calomine lotion was about the most effective treatment.

Commander Petro observed that the best method of combating the disturbance would be to withdraw from use all masks in which the rubber was known to have been treated with the unnamed compound.

To Auction Rainbow Assets

The assets of the Rainbow Rubber Co., including machinery, equipment, furniture, fixtures and supplies, will be sold at public auction at the plant in East Butler, Penna., on Tuesday, July 28. The company, headed by H. B. Callahan, which has been making rubber soles and household appliances, is voluntarily liquidating. The auction is in the hands of the Industrial Plants Corp., 90 West Broadway, New York City.

Blue Ridge Buys New Plant

Blue Ridge Rubber Co., Tanneytown, Maryland, whose plant was recently destroyed by fire, has purchased the plant of the Cannon Shoe Co. at Littlestown, Penna. Rebuilt machinery from the Tanneytown plant will be transferred to the new plant as quickly as possible. Blue Ridge is a subsidiary of the Cambridge Rubber Co., Cambridge, Mass.

UNDERWRITERS' LABORATORIES REVISE HOSE SPECIFICATIONS

In the interests of rubber conservation the War Production Board recently cut the amount of crude rubber which could be used in fire hose from about 17 to a maximum of 7 pounds per hundred feet in the 2½-inch size and correspondingly in other sizes. This order had the immediate effect of making it impossible for manufacturers to supply hose meeting the standard of Underwriters' Laboratories and the specifications under which thousands of cities have been ordering. Accordingly, to remedy the situation, the Laboratories, which maintain headquarters at 207 E. Ohio St., Chicago, have developed an emergency alternate specification for fire hose and manufacturers are now supplying hose built to the new specifications.

Hose complying with this new, emergency alternate specification, inspected at the factory and bearing the Laboratories' label as evidence of conformance with the requirements, is the most satisfactory fire hose it is possible to produce commercially today for other than War Department use. This hose will handle equally as well as hose meeting Underwriters' Laboratories' regular specifications which have been in effect for many years and upon which thousands of cities and towns have depended for many years.

Major Differences Explained

The main difference between the new and the old hose is that the new hose will probably not last as long. Otherwise the performance characteristics remain much the same. Burst pressures for the new hose in 1½-in., 2½-in., 3-in. and 3½-in. sizes, double jacketed, remain 600 pounds per square inch. Certain outstanding and unique requirements found only in Underwriters' Laboratories' EA (emergency alternate) specifications for fire hose assure satisfactory performance.

Fire hose specifications usually include a life test on the rubber lining of the hose. Such a test is included in the EA specifications, requiring that after 96 hours in a dry heat oven at 158° ± 2°F. the tensile strength of the rubber lining samples shall be not less than 75% of the tensile strength of samples which have not been subjected to this heating.

While this test develops some useful information, unless supplemented by additional tests, it is not considered as being at all conclusive that a proper rubber compound is being used for the hose lining. And as experience shows that inferior samples can pass this test, an oxygen bomb aging test is also included in the Laboratories' EA specifications.

In the oxygen bomb test, samples of the rubber lining are subjected to the action of oxygen at 300 pounds per square inch pressure and at 70° C. for 96 hours. After this test the tensile strength and the amount a sample will stretch before breaking must be at least 60% of the tensile strength and stretch of samples not subjected to the oxygen bomb accelerated aging test.

Rubber technologists agree that the oxygen bomb test with its subsequent tensile and stretch requirements is considerably more severe than the oven test followed by a tensile test. It is therefore more suitable for definitely determining the aging qualities of rubber compounds.

In checking fire hose submitted to the Laboratories for labeling, the oxygen bomb test is conducted on samples obtained at the factory from each lot of 200 lengths of hose. At the average hose factory this means that samples are taken from approximately each batch of compound made up for hose linings.

The EA specifications also call for elongation, twist, and warp tests on both single and double jacketed hose. On single jacketed hose the tests are conducted at 300 pounds pressure and the elongation is limited to not more than 12%. On double jacketed hose the test pressure is 400 pounds and the elongation is limited to not more than 8%. These tests are conducted on each length of hose submitted to the Laboratories for labeling.

In each lot of 50 lengths a kink test is made on both the single and double jacketed types; and out of each 100 lengths a burst test is run. The requirements call for burst pressures of at least 600 pounds for double jacketed hose, and 450 pounds for the single jacketed.

U. S. Ice Grip Tread Tire

A new airplane tire which prevents skidding on glare ice has been developed at the Detroit plant of the U. S. Rubber Co. Known as the U. S. Ice Grip Tread, the tire features sharp, cylindrical, crimped steel inserts which make the tread instantly effective on both snow and ice. When the tire is in operation the portion of each insert exposed at the road-engaging surface of the tread wears down quickly until the exposed portion of the insert extends below the tread surface. Thereafter, the rate of wear of the inserts is substantially the same as the rate of wear of the tread rubber. Present production of the new airplane tire is limited to the U. S. Army Air Force. It is said to have definite post-war possibilities.

W.S.S. Protex Non Rust Oil

W.S.S. Protex Non Rust Oil, developed by the Wayne Chemical Products Co., Detroit, Mich., is said to be of interest to the rubber industry. The oil, which is used for protecting steel attached to or near rubber from rust damage, may be sprayed or brushed on steel parts after fabrication. The oil does not harm or swell the rubber as do most ordinary oils. Steel parts must be protected against rust during storage, shipment and export. W.S.S. Protex is used in a water solution and is sold in base form or in ready-to-use form.

FIRESTONE BUILDING 10-MAN COLLAPSIBLE RUBBER LANDING BOATS

The collapsible rubber boat now being built by the Firestone Tire & Rubber Co., which can be inflated in a few seconds by carbon dioxide carried in a container built into the side of each boat, holds ten fully equipped men. In the above reproduction, American soldiers are seen in the act of demonstrating a practice landing operation. When folded, the boats make a compact bundle measuring 90 inches in length. When inflated, the boats expand to a length of 18 feet with a beam of 8 feet.

Acquires Lower Rubber Mfg. Co.

The business and mechanical rubber goods factory of the Lower Rubber Mfg. Co., Ravenna, Ohio, has been acquired by Chamberlain Engineering, Ltd., a unit of the U. S. Stoneware Co. The mechanical goods line will be maintained but the plant will be used principally for milling, calendering, extruding and molding operations on the Tygon series of rubber-like materials developed by U. S. Stoneware. Provision will also be made for the production of Duralon, a synthetic resin with a polymerized furfural orthosilicate base, as a substitute for hard rubber in all extruded and molded shapes. The technical facilities and sales organizations of Lower Rubber and Chamberlain Engineering will be merged. M. S. Lower, former president of Lower Rubber, will serve as general manager of the plant which will be operated as the Lower Rubber Mfg. Division of Chamberlain Engineering, Ltd.

Millimar—New Loading Material

Millimar, an organic low dielectric constant loading material for use particularly with electrical insulating rubber compounds, has been introduced by the R. T. Vanderbilt Co., 230 Park Ave., New York City. The new material is a special form of gilsonite retaining all the desirable properties of gilsonite, such as low capacitance, low moisture absorption and high modulus, but with the added property of easy incorporation in rubber. Millimar is ground to about 20 mesh for easy handling without dusting. It is said to be particularly desirable in low rubber content compounds where good electrical and processing characteristics are desired. It produces considerably drier and firmer uncured stocks than a corresponding loading of mineral rubber, according to the supplier.

Tarzac—A New Plasticizer

Tarzac, a new plasticizer for synthetic rubber, particularly of the Buna N type, has been introduced by the R. T. Vanderbilt Co., 230 Park Ave., New York City. Tarzac is oil-like in consistency and readily mills into the rubber. It also is used in Channel Black S, Thermax S and Kalvan S, and the use of these results in the quick incorporation of both plasticizer and loading material in the rubber, preventing the dusting of the powders. Tarzac, used directly or with the S pigments mentioned, produces stocks that calender and extrude smoothly and rapidly.

A refinishing lacquer especially made for golf balls has been introduced under the name of "Nu-Glo" by the M.V.C. Laboratories, Inc., 4325 Harris St., Toledo, Ohio. It is said to be tough and durable and to give a brilliant white finish. One bottle is sufficient for 24 balls.

Another Berliner "Report"

The firm of J. J. Berliner & Staff, 225 Fifth Ave., New York City, has issued another "report" intended for rubber chemists and technologists. This latest "report" is called "New Developments in Rubber Substitutes," consists of 54 mimeographed pages in a loose-leaf folder, and is quoted at $18.00 per copy. The "report" is divided into ten sections, the first of which is a partial reproduction of the government circular (C427) prepared by L. A. Wood of the National Bureau of Standards under the title: "Synthetic Rubbers: Their Compositions, Properties, and Uses." The next eight sections consist of reproductions in full or part of articles which have appeared in the *India Rubber World* (Vol. 104, No. 6 and Vol. 105, Nos. 4 and 5), *Canadian Chemistry & Process Industries* (Vol. 25, No. 4), *American Gas Journal* (Vol. 154, No. 5), and the *Automobile Engineer* (Vol. 31, No. 409). The tenth section contains abstracts of American and foreign patents on miscellaneous subjects secured from "various sources." The "report" has no value to anyone in the rubber industry who has access to any of the regularly published journals in the rubber and allied fields.

Firestone Tire & Rubber Co.

Six Months Ended April 30: Net profit of $5,193,024, including profits of foreign subsidiaries which were remitted to the company during the period, but after deductions for depreciation, interest, and Federal taxes, including $5,095,648 estimated excess profits taxes, and provision of $1,500,000 as an additional reserve for contingencies. After allowing for dividends on the 6% cumulative preferred stock, Series A, the earnings amounted to $1.97 a share on the outstanding shares of common stock. For the previous six months, Firestone reported net profit of $4,789,165, after providing $1,500,000 reserve, or $1.75 per common share.

Dunlop Rubber Co., Ltd. (England)

For 1941: Net profit of £1,261,649 ($5,097,062), after deduction of £1,924,620 ($7,775,465) for taxes but before transfer of £650,000 ($2,626,000) to the income tax reserve toward 1942-43 liability, which compares with a net profit of £1,259,975 ($5,090,299) reported for 1940. Profit after depreciation and other charges but before provision for taxes amounted to £3,186,269 ($12,872,527) against £3,001,855 ($12,127,494) in the previous year. The pound is currently quoted at $4.04.

Accelerators Added to Lines

Mercaptobenzothiazole and benzothiazyldisulfide have been added to the lines of rubber accelerators sold by the Naugatuck Chemical Division of U. S. Rubber Co. and the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc. Both companies will sell the accelerators under the designations of MBT and MBTS, respectively. The United States patents covering the manufacture and sale of these materials expired on July 7. Both materials have been available for the past several years and will continue to be available from the R. T. Vanderbilt Co. under the trade names of Captax (mercaptobenzothiazole) and Altax (benzothiazyldisulfide). These popular accelerators find application in natural, reclaimed and synthetic rubber stocks.

Mountings for Airplane Engines

Development of a radically new type of suspension mounting for airplane engines has been disclosed by the Goodyear Aircraft Corp., subsidiary of the Goodyear Tire & Rubber Co., Akron. Although no details of the new mountings were made available, it was said that they offer four distinct advantages over previous types, as follows: (1) Longer life for airplanes, due to less vibrational stress on the structure and other parts; (2) Greater fire accuracy, with gunners subjected to less vibration in their gun turrets; (3) More accurate aiming of bombs, due to decreased vibration in instruments, such as bombsights; and (4) Less vibration-inspired nervous strain on pilots, navigators, gunners and others on long flights.

Fairprene Cements and Compounds

A new line of industrial adhesives, known as Fairprene Cements and Caulking Compounds, has been announced by the Fabrikoid Division of E. I. du Pont de Nemours & Co., Inc., Fairfield, Conn. The new adhesives are described as "unvulcanized synthetic elastic compositions, dispersed in a suitable solvent, which contain either the activating ingredients for vulcanization with heat, or are so formulated that vulcanization will take place at atmospheric temperatures with the addition of a solution of activating ingredients." Fairprene Cements may be used to adhere various combinations of cured and uncured neoprene stock, cured and uncured neoprene-coated fabrics, cured and uncured rubber, leather fabrics, and paper.

An order for twenty-one additional patrol airships of the "K" type has been awarded to the Goodyear Aircraft Corp. by the U. S. Navy. "K" ships are inflated with 416,000 cubic feet of helium gas, are powered by two 400 h.p. engines, have a top speed of close to 80 m.p.h. and a cruising radius of 2,000 miles.

TESTING MATERIALS SOCIETY HOLDS 45th ANNUAL MEETING

Approximately 1,400 members, committee members and guests attended the Forty-Fifth Annual Meeting of the American Society for Testing Materials, held in Atlantic City, N. J., June 22 to 26. More than 200 committee meetings were held in addition to a Symposium on Radiography, a Session on Alternate Steels, and a Round-Table Discussion on Water. More than 55 new tentative standards were approved for publication and some 70 existing tentative specifications are to be referred to Society letter ballot for adoption as standard.

In the annual report of the Executive Committee the ways in which the Society has contributed to the war effort were stressed, the report listing the work of numerous standing committees which had cooperated in emergency research and specifications. Some 50 specifications have been affected by emergency alternate provisions which are designed to expedite procurement or to conserve critical and strategic materials and a number of emergency specifications have already been issued.

New officers elected during the meeting included the following: *President,* H. J. Ball, Professor of Textile Engineering, Lowell Textile Institute; *Vice-President,* P. H. Bates, chief, Clay and Silicate Products Division, National Bureau of Standards. Mr. Bates will serve with Dean Harvey, materials engineer, Engineering Laboratories and Standards Department, Westinghouse Electric & Manufacturing Co., who was elected vice-president in 1941.

An important action at the meeting was the approval for publication of a test for indentation of rubber by means of the durometer as developed by the Society's Committee D-11 on Rubber Products. While no instruments have been investigated which possess all of the characteristics desired in hardness testing, the Committee feels that standardization and calibration of durometers will go a long way in accomplishing the objective sought and the new test is in line with this premise. Another action involved the existing tentative test for viscosity and total solids content of rubber cements which is to be adopted as an A.S.T.M. standard.

Committee D-11 will submit shortly to the Society certain emergency provisions in the Specifications for Cotton Rubber-Lined Fire Hose (D-296) and plans also to perfect a new test covering compressed asbestos packings. Technical Committee A on Automotive Rubber, which is a joint project with the S.A.E., is completing its program of classification, reducing the number of standard compounds and defining these compounds in terms of physical properties.

The necessity of having adequate information and tests to cover the physical properties of rubber and rubber-like materials at subatmospheric temperatures has led to the organization of a new subcommittee in this field.

SEVERAL CHANGES ARE MADE IN MONSANTO CHEMICAL ORGANIZATION

David J. Beaver **R. L. Sibley** **Harry A. Merkle**

Dr. R. L. Sibley, director of research of the Rubber Service Department of the Organic Chemicals Division of Monsanto Chemical Co., has been made general manager of manufacturing in charge of all production and research activities at Nitro, West Virginia. Dr. David J. Beaver, assistant director of research at the Nitro laboratories, has been named director of research, and Harry A. Merkle, production superintendent of the Nitro plant, plant manager. Mr. Merkle succeeds Herman K. Eckert who is now plant manager of Monsanto's synthetic rubber chemicals plant at Texas City, Texas.

Dr. Sibley was born on May 24, 1888, in Spencer, Mass., studied at Clark College and Clark university, obtaining degrees in physics and chemistry, continued his education at Princeton and then studied law for two years at New York University. He was an instructor in chemistry at Hobart College from 1911 to 1913 and assistant professor of chemistry at Akron University from 1914 to 1918. In 1921 he joined Standard Oil (N. J.) as a patent attorney and came to the Rubber Service Laboratories in 1926 in the same capacity. When the latter company became Monsanto's Rubber Service Department in 1929 he became director of research.

Dr. Beaver was born on February 23, 1893, in Schenectady, N. Y., received his education at Union College and Columbia University, receiving a Ph. D. from the latter in 1921, and began his professional career as a research chemist for Firestone, working on accelerators and antioxidants. He spent 1922 with the Grasselli Chemical Co. and joined the Combustion Utilities Corp. as a research chemist in 1923, becoming assistant director of research two years later. In 1932 he joined Monsanto as a research chemist and was named assistant director of research at Nitro in 1936. He served in the last war as a lieutenant in the Chemical Warfare Service. Dr. Beaver is a member of the American Chemical Society.

Mr. Eckert was graduated from Akron University in 1922 with a degree in rubber chemistry, joined Rubber Service Laboratories as a development compounder in the same year, went into operations work at the Nitro plant in 1926, and progressed through the ranks of plant supervisor and operating superintendent before becoming plant manager in 1938.

Mr. Merkle received a B.S. in chemistry from Hobart College and immediately upon graduation joined the Rubber Service organization at Nitro as a production chemist. In 1938 he was appointed production superintendent, from which he moves to the plant managership.

To Manufacture Rubber Serums

The Synthetic Rubber Saver Corporation has been organized in New Haven, Conn., to manufacture "synthetic rubber serums and extenders" developed by Sam Baron and his son, Jack Baron. Robert M. Blake is president of the new corporation, Jack Baron is vice-president, and Sam Baron is secretary and treasurer. The new concern maintains a laboratory at 73 Wallace Street in New Haven. The War Production Board is reported to be interested in the type of synthetic products being manufactured by the new company.

Cabot to Make War Parts

Cabot Shops, Inc., southwestern subsidiary of Godfrey L. Cabot, Inc., of Boston, Mass., has received a substantial order from the War Department for the manufacture of gun steel and gun tube forgings. This company, located in the Texas Panhandle, is essentially the construction and maintenance division of Cabot's carbon black and natural gasoline operations in the southwest and for the last several years has been manufacturing and distributing a full line of oil well pumping units and oil field surface equipment on a national scale.

AKRON RUBBER GROUP HAS LARGEST SUMMER OUTING

The largest summer outing held to date by the Akron Group, Rubber Division, A.C.S., was held on June 19 at the Fairlawn Country Club. Approximately 600 members and guests were in attendance, more than 150 of whom participated in the golf and other tournaments. The outing was in the hands of Ed Nahm (Naugatuck Chemical) who was ably assisted by E. W. Ballard (Midwest Rubber Reclaiming), W. J. Krantz (Goodyear), C. B. Moore (Philadelphia Rubber Works), Ray Taylor (Firestone), Enos Baker (Binney & Smith), Lester Brock (Continental Carbon), and Glen Harry (Goodyear Aircraft).

Prizes were awarded to winners in the various contests, those in the golf tournament including a golf bag for the longest drive to Francis Boling (Goodrich), a dozen golf balls for closest to the pin to F. A. Martin (Hoover), a rain jacket for most balls out of bounds to C. E. McLaughlin (Goodyear), and a rain jacket for the shortest drive to D. H. Smith (Castle Rubber). Distribution of prizes was made possible by donations received from the following firms:

Akron Chemical Co., Akron Paint & Varnish Co., Akron Standard Mold Co., L. Albert & Son, American Cyanamid & Chemical Corp., American Zinc Sales Co., Anaconda Copper Mining Co., Baker Chemical Co., Barium Reduction Corp., Barnsdall Oil Co., Barret Division of Allied Chemical & Dye Corp., Binney & Smith Co., Bridgeport Brass Co., Bridgewater Machine Co., Godfrey L. Cabot, Inc., Cannon Mills, Inc., Carbide & Carbon Chemicals Corp., Central Rubber Corp., Columbia Chemical Division of Pittsburgh Plate Glass Co., Continental Carbon Co.

Continental Rubber Co. of New York, Dill Mfg. Co., Dow Chemical Co., Du Pont, Eastern Magnesia Talc Co., English Mica Co., Erie Railroad, Russell Farley & Co., Farrel-Birmingham Co., Firestone Tire & Rubber Co., John Gammeter, General Atlas Carbon, General Magnesite & Magnesia Co., B. F. Goodrich Co., Goodrich Silvertown Stores, Goodyear Tire & Rubber Co., C. P. Hall Co., Herron & Meyer, J. M. Huber, Inc., Hycar Chemical Co., Imperial Oil & Gas Co., *India Rubber World*, International Pulp Co., Johnson Rubber Co., Manufacturers Rubber & Supply Co., C. F. Marshall Co., McNeil Boiler Co., Midwest Rubber Reclaiming Co., Monsanto Chemical Co., H. Muehlstein & Co., F. F. Myers.

National Rubber Machinery Co., National Standard Co., Naugatuck Chemical, N. J. Zinc Co., Niagara Sprayer & Chemical Co., Ohio Mineral Spirits Co., Ohio Rubber Co., Ohio Sherardizing Co., Ozark Mining & Smelting Co., Philadelphia Rubber Works, Piqua Stone Products Co., Republic Rubber Co., Rex-Hide, Inc., Rohner Paper Co., RUBBER AGE, St. Joseph Lead Co., A. Schrader's Son, A. Schulman, Inc., Seiberling Latex Products Co., Seiberling Rubber Co., Sharples Chemicals, Inc., Shell Oil Co., V. L. Smithers, Inc.

Southern Acid & Sulphur Co., Stamford Rubber Supply Co., Standard Chemical Co., Standard Oil Co. of N. J., Stauffer Chemical Co., Sun Oil Co., Superior Zinc Corp., Synthetic Products Co., Thiokol Corp., Thompson, Weinman & Co., Thomson & Kennon, Titanium Pigment Corp., Turner Halsey Co., United Carbon Co., R. T. Vanderbilt Co., C. K. Williams & Co., Charles T. Wilson Co., Wishnick-Tumpeer, Inc., Xylos Rubber Co.

Coming Events

July 24-25. Los Angeles Rubber Group, Uplifters' Club, Los Angeles, Calif.

Sept. 10-11. Rubber Division, A.C.S., Fall Meeting, Hotel Lafayette, Buffalo, N. Y.

Oct. 5-9. National Safety Congress, Stevens Hotel, Chicago, Ill.

Oct. 12-14. American Society of Mechanical Engineers, Fall Meeting, Rochester, N. Y.

Nov. 16-18. American Institute of Chemical Engineers, Annual Meeting, Hotel Netherlands Plaza, Cincinnati, Ohio.

Nov. 17-22. Second National Chemical Exposition, Stevens Hotel, Chicago, Ill.

Nov. 30-Dec. 4. American Society of Mechanical Engineers, Annual Meeting, New York City.

Form Electrochemicals Department

E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, has announced that effective immediately the former R. & H. Chemicals Department will be known as the DuPont Electrochemicals Department. The change was in name only and does not affect products, policies or personnel.

Statistics

Following our policy of publishing our complete Statistical Section every other month only, the Section is omitted from this issue. Data to be added to the statistical tables in our June issue follows:

Cotton: The average price of middling uplands on the N. Y. Cotton Exchange for the month of June was 19.78c, based on 26 trading days.

Rims: Total branded rims produced by members of the Tire & Rim Association during June, 1942, amounted to 554,786.

ANNUAL OUTING IS HELD BY RHODE ISLAND RUBBER CLUB

Approximately 80 members and guests attended the outing of the Rhode Island Rubber Club held on June 26 at the Metacomet Golf Club, East Providence, R. I. A golf tournament was held in the afternoon with prizes for low gross going to Ed Colligan (Quabaug Rubber) and for the kicker's handicap to E. W. Varnum (Quabaug Rubber) and L. Yates (Industrial Paper & Cordage). The latter prizes were distributed by drawing.

The speaker of the evening was Col. George R. Thompson, deputy chief of instruction of the Rhode Island Civilian Defense. He confined his talk to the civilian defense set-up in the state, with special emphasis on the types of gases which may be used before the war is over.

Distribution of prizes at the outing was made possible by donations from the following companies: Akron Standard Mold Co., Binney & Smith Co., Continental Carbon Co., Wm. D. Egleston Co., Ernest Jacoby & Co., H. Muehlstein & Co., Naugatuck Chemical, N. J. Zinc Co., Pequanoc Rubber Co., A. Schulman, Inc., R. T. Vanderbilt Co., L. G. Whittemore, Inc.

Reminder on Contest Papers

Fred E. Traflet, of the Pequanoc Rubber Co., Butler, N. J., chairman of the New York Group, Rubber Division, A.C.S., calls attention to the fact that papers for the 1942 Prize Essay Contest of the Group must be submitted by September 9, 1942. Papers should be of a technical nature relating to any raw materials or processes concerned with the manufacture of rubber products. They may be the result of original work, development results, or interpretive results and reviews of rubber literature. The contest rules provide that all those planning to submit papers must indicate their intention and submit titles to Mr. Traflet on or before August 19, 1942.

Tent Fabric Uses No Rubber

Goodyear Tire & Rubber Co., has started production of waterproof and fireproof tent fabric which uses no rubber or other critical war materials. The use of rubber for processing canvas duck for army tents was prohibited as of June 1. Utilizing new ingredients, the Goodyear-processed fabric, which is made on equipment formerly used to produce Pliofilm, now discontinued, is said to go farther beyond government specifications than previous processes which used rubber. In addition to being waterproof and fireproof, as required, the new fabric is also less susceptible to intense heat or cold.

JOINT COMMITTEE REPORTS CLASSIFICATION OF RUBBERS

For the past several months Technical Committee A on Automotive Rubber Products, a joint ASTM-SAE group, and two of its sub-committees, have been working on standard classifications, specifications, and tests for both natural and synthetic rubber, currently to conserve rubber stocks and ultimately to enable industry in general to make the widest possible use of both products. The progress made by one of the sub-committees—Subcommittee V—was reported in our last issue. This committee was concerned with synthetic rubber.

A complete report has since been made by the joint committee to its sponsors and some details concerning the work have been released by the Society of Automotive Engineers. Interest now is centered in rubber for automotive and aeronautical purposes other than tires. Initially the new rubber classifications are to be recommended to the War Production Board for promulgating the war emergency conservation program. Later, it is believed, the work accomplished will serve to bring about the adaptation to thousands of new industrial uses of both natural and synthetic rubbers, whichever is cheaper and available.

The primary object of the automotive engineers, rubber experts and representatives of the armed forces has been to conserve present rubber stocks by assuring the most effective and economical use. To this end they have reduced from several hundred to less than 100 the number of rubber compounds, classifications, and specifications, and have established physical properties, characteristics, and standard tests for each compound to facilitate use for such industrial purposes as providing resiliency and absorbing noise and vibration.

The system of classifications, which cover 57 synthetic and 40 natural rubber compounds, is designed both to conserve rubber by enabling manufacturers to select those compounds whose properties and characteristics are known to meet the requirements of specific uses, and also to make effective use of alternative compounds. It is believed the undertaking greatly will simplify the work of designers and manufacturers by establishing the physical properties and characteristics of the various compounds, and by providing standard specifications and tests.

The classifications, specifications, and tests already are viewed as satisfactory for many mechanical uses other than in the automotive and aeronautical industries. In its broader aspects, the project is not unlike that whereby, in the early days of steel-making, experience and research produced not only many different steels and types of steel, but created new industrial applications as the availability and characteristics of the product became known. Since the classifications cover both natural and synthetic compounds, they will be suitable for use in the present and post-war period and regardless whether production of synthetic rubber is undertaken on a large scale, as currently is expected, or importation of natural rubber is resumed.

Synthetic rubbers are placed in three groups—A, which includes three types of Thiokol; B, which covers Chemigum, Hycar OR, Perbunan, and one type each of Thiokol and Neoprene; and C, which includes four types of Neoprene. Each classification is identified first by the letter "S", meaning synthetic; then by A, B, or C, depending upon the group; and finally by numerals indicating the range of ASTM hardness as measured by the Shore durometer and the original tensile strength. Additional data indicate measurements of elongation and of compression set; changes in tensile strength, elongation, and hardness after oven-baking; and changes in tensile strength, durometer, and volume after oil aging.

Natural rubber classifications are denoted by the letter "R", followed by "A", for general purpose compounds; "B", for compounds meeting maximum compression set requirements; and "C" for compounds adapted to outdoor aging. Numerals indicate durometer and minimum tensile strength. Additional data show minimum elongation, 20 per cent load deflection, and compression set.

In preparing the classifications, specifications, and standard tests, standard ASTM test procedure was followed with few exceptions. It is proposed, as time and war-work permit, to develop additional standard laboratory tests for other properties and characteristics, and also to devise quick, reliable acceptance tests and test-instruments which may be utilized in factories either for batch or sample testing.

The entire project supplements work completed some time ago in the preparation of standards for rubber compounds suitable for use as engine mounts and automotive brake hoses. L. A. Danse (Cadillac) is chairman of the joint technical committee and J. D. Morron (U. S. Rubber) is secretary. Classifications for natural rubber were developed by Subcommittee IV, of which W. J. McCortney (Chrysler) is chairman and J. C. Dudley (Chrysler) is secretary, while classifications for synthetic rubber were developed by Subcommittee V, of which J. H. Doering (Ford) is chairman and J. V. Hendrick (Chrysler) is secretary.

TWO OF THE NEWLY-ELECTED OFFICERS OF THE AKRON RUBBER GROUP

T. L. Stevens

A. E. Sidnell

As reported in our April, 1942, issue, T. L. Stevens, of the C. P. Hall Co., was elected chairman, and A. E. Sidnell, vice-president and factory manager of the Seiberling Latex Products Co., was elected vice-chairman of the Akron Group, Rubber Division, A.C.S. Photographs of both newly-elected officers are reproduced above.

Mr. Stevens, long associated with the activities of the group in numerous capacities, was graduated from the University of Akron in 1927. He joined the Firestone Tire & Rubber Co. shortly thereafter and has recently completed twelve years of service with the C. P. Hall Co.

Mr. Sidnell is also a graduate of the University of Akron, where he received a B.S. in chemistry, specializing in rubber chemistry. He served in the first World War in the Signal and Air Corps and was with Gates Rubber as chief chemist for five years immediately after the war. He also served as production superintendent of the Cooper Corp. for 2 years.

In 1929 and 1930 Mr. Sidnell served as development manager at Toronto for the Seiberling Rubber Co. of Canada, Ltd., and since that time has been associated with the Seiberling Latex Products Co. as vice-president and factory manager.

NAMES IN THE NEWS

DR. V. E. WELLMAN, associated with the B. F. Goodrich Co. since 1929, has been appointed manager of the company's newly-organized chemical and pigments department of the purchasing division.

THOMAS MIDGLEY, JR., vice-president of the Ethyl Gasoline Corp. and chairman of the board of the American Chemical Society, has been elected an honorary member of the National Academy of Science. He was recently awarded the Willard Gibbs Medal.

HOMER E. LUDWICK, controller of the Firestone Tire & Rubber Co., has been elected president of the Los Angeles Control of the Controllers Institute of America.

OTTO L. BEISWENGER, manager of the Power Division of the Goodyear Tire & Rubber Co., has been appointed manager of that company's engineering staff, succeeding HENRY G. SCHMIDT who has taken a position in the coal industry in Cleveland. The new manager has been with Goodyear since 1916.

DR. H. E. HOWE, editor of *Industrial & Engineering Chemistry*, has been awarded the 1942 Chemical Industry Medal of the Society of Chemical Industry. He will receive the award and deliver an acceptance address at a joint meeting of the American Section of the S.C.I. and the New York Section of the A.C.S. to be held in New York on November 6.

JEROME TAYLOR, prominent Akron attorney, has joined the B. F. Goodrich Co., Akron, as assistant counsel. He has been engaged in the practice of law since his graduation from the Columbia University Law School in 1931.

WILLIAM J. AUSTIN, manager of the Chicago office of the Explosives Department of the Hercules Powder Co., Wilmington, Delaware, has been appointed director of purchases for the company, succeeding KURT W. JAPPE.

J. PENFIELD SEIBERLING, president of the Seiberling Rubber Co., Akron, has been designated as a special lecturer at the University of Buffalo's School of Business Administration.

GEORGE W. HINSHAW, vice-president and factory manager of foreign operations of the Goodyear Tire & Rubber Co., Akron, recently completed 25 years of service with the company. He was presented with the usual diamond-studded pin and $100 in cash.

DR. NORMAN A. SHEPARD, chemical director of the American Cyanamid and Chemical Corp., now serving with the War Production Board, was recently elected vice-chairman of the American Section of the Society of Chemical Industry. DR. FOSTER D. SNELL, head of the testing laboratories bearing his name, is chairman.

PAUL BROWN, formerly assistant to the president in charge of manufacturing of the Standard Coated Products Co., New York, has been appointed assistant vice-president in charge of operations at the Butler, N. J., plant of the American Hard Rubber Co. He will maintain headquarters at Butler.

IN THE SERVICE

CAPT. D. E. CABLE, formerly technical librarian of the General Laboratories of the U. S. Rubber Co., who has been serving in the Procurement Division of the Chemical Warfare Service at Dallas, Texas, has been transferred to the newly-established administrative office of the C.W.S. maintained at the Gates Rubber Co. plant in Denver, Colorado. He is in charge of production inspection of gas mask assembly.

FRED C. TUCKER and R. E. LARSON, field representatives of the tire engineering and service department of the U. S. Rubber Co., have been granted leaves of absence to join the service. MR. TUCKER has been made chief tire inspector for the Army Quartermaster Corps, 8th Corps Area, with headquarters at San Antonio, Texas, and MR. LARSON for the 9th Corps Area, with headquarters at Salt Lake City, Utah.

JAMES L. COCHRUN, JR., former export sales representative for the Seiberling Rubber Co., Akron, who has been serving as a First Lieutenant, has been advanced to the rank of Captain of Infantry at Fort Benning, Georgia.

Washington Appointments

Ben W. Lewis, price executive of the Rubber Price Branch, OPA, has been appointed special representative aiding in field price administration. Robert F. Bryan, associate price executive, will be in charge of the Rubber Price Branch while Mr. Lewis is engaged in his new duties.

Robert S. Betten, associate chief of the Tire Rationing Branch, OPA, has been advanced to the post of chief of the branch, succeeding Dr. Charles F. Phillips who has been appointed to the newly-created position of Director of the Automotive Supply Rationing Division.

Changes at U. S. Rubber Co.

Several changes in executive personnel have been announced by U. S. Rubber in recent weeks, including the following: Fred S. Carpenter, production manager of the tire division, has been named general manager of that division. Howard N. Hawkes, who has been serving as general sales manager of the division, becomes assistant general manager in charge of sales activities. Harmon F. Newell, formerly sales and production coordination manager, will be in charge of tire division policies.

J. E. Cady, C. E. Maynard, and C. L. Remy remain as factory managers of the Indianapolis plant, Fisk division plant at Chicopee Falls, and the Los Angeles plant, respectively. G. R. McNear, formerly in the New York offices, becomes factory manager of the Detroit plant replacing C. L. Moody who becomes factory manager of the tire plant at Kitchener, Ontario. R. Y. Copland, formerly manager of the Kitchener plant, becomes production manager of the tire division, succeeding Mr. Carpenter.

W. C. Manville has been named manager of the field engineering and service department, replacing S. P. Thacher now serving as chief of the rubber conservation section of the Army and Navy Munitions Board. Arnold F. Van Pelt, formerly assistant general manager of the tire division, now heads the newly-created department of business research formed by the company to study and evaluate developments in expanding fields.

Forms P. H. Hermsen Co.

Back in 1934 the Heart Rubber Co., Little Chute, Wisconsin, a corporation, discontinued its manufacturing operations. Since that time P. H. Hermsen, an officer of the corporation, has rented its plant and equipment and has continued the production of molded tubes. For reasons of convenience, he has been doing business under the name of the Heart Rubber Co. Now, however, due to government rulings and other reasons he has formed the P. H. Hermsen Co. and will continue operations in the future in that name.

New Firestone Movie

A new sound motion picture, entitled "For America We Save," has been released by the Firestone Tire & Rubber Co., Akron. It is a dramatic portrayal of critical developments in the rubber situation following the Japanese attack on Pearl Harbor and includes scenes showing the cultivation and gathering of rubber on the Firestone plantations in Liberia. The movie not only emphasizes the importance of getting every possible mile of service from tires now in use, but also shows the essential services necessary to insure maximum tire mileage.

NEWS IN BRIEF

An interesting review of the rubber situation appears in the current issue of *The Index*, house organ of the New York Trust Co., 100 Broadway, New York City, issued quarterly. Synthetic rubber is called the nation's chief hope of additional rubber supplies.

A satisfactory substitute for rubber hose, made of plastic, to be used in connection with the stirrup pump recently designed by WPB for the Office of Civilian Defense has been developed. Specifications for the plastic hose are available to manufacturers. Maximum retail price for stirrups will be below $5.00.

N. J. Zinc Co., 160 Front St., New York City, has issued its third folder in the series designed to inform American business of the wartime status of zinc. Use of zinc in various wartime industries is stressed by word and picture. The series is published under the title "Zinc in War."

Northern Pump Co., Minneapolis, Minn., Navy Ordnance plant, has released a 40-page pictorial record of its war production operations and morale methods. Entitled "Building Production Morale," the booklet is a dramatic document of an important contribution to the war effort. Copies are available on request to the company.

A booklet on plant efficiency has been published and is available from the Division of Information, War Production Board, Washington, D. C. Called "Plant Efficiency—Ideas and Suggestions on Increasing Efficiency in Smaller Plants," the booklet is in simple terms and is designed primarily for smaller war plants or for plants which are just getting into war production.

As part of the program to enlist the cooperation of America's motorists to keep their driving speeds under 40 m.p.h. Firestone has made available a new rear window sticker. The sticker bears the message "Save Rubber, Victory Speed, 40," printed in a V formed by the outstretched wings of the American eagle. It is being distributed by Firestone dealers and stores.

A bibliography on synthetic rubber has been compiled by the Technical Department of the Tulsa Public Library, Tulsa, Oklahoma. The bibliography is divided into various classifications and is based largely on references found in the library. Copies are available on request.

In recognition of excellence in the production of gear drives for Navy ships, the three plants of Farrel-Birmingham Co., Inc., at Ansonia and Derby, Conn., and Buffalo, N. Y., have been awarded the Navy "E", traditional symbol for a job well done.

A memorandum regarding synthetic rubbers, their application, and types of carbon black required, has been prepared by Dr. I. Drogin, director of research, United Carbon Co., Charleston, West Virginia. It is in question-and-answer form and furnishes a good deal of fundamental data.

Edelco Rubber Co., importers, exporters, and distributors of rubber products, has removed its general offices to 425 Fifth Avenue, New York City. S. Heinz Edelmuth is head of the organization.

The U. S. Testing Co., Inc., Hoboken, N. J., is sending representatives to Brazil to handle the inspection and testing, at the source, of large quantities of materials purchased by American firms. A. O. Silva is in charge of South American activities. He makes his headquarters at Sao Paulo, Brazil.

A booklet under the title of "Priorities Instructions," which explains in detail procedures to be used in connection with Army and Navy priorities, has been issued by the Army and Navy Munitions Board, Washington, D. C. Copies are available for the asking.

A new protective paint, designed expressly for protection of fumigating equipment and similar enclosures where destructive fumes are involved, has been introduced by the Resistoflex Corp., Belleville, N. J. It is supplied in the form of a primer and a finished coat.

An interesting pictorial booklet on conversion of plants to war work under the title of "Conversion—How to Go After War Work" has been prepared by WPB. Copies are available on request to the Division of Information, War Production Board, Washington, D. C.

A line of protective clothing coated with neoprene is now being manufactured by the Safety Clothing & Equipment Co., 7016 Euclid Ave., Cleveland, Ohio. Items include coats, pants, coveralls, welding jackets, aprons, sleeves, leggings and gloves.

The "OEM Handbook," describing the functions and organization of the war agencies within the Office for Emergency Management, was recently issued. It describes in detail the organization of WPB, OPA and the other constituent agencies of the OEM. Personnel is included. Copies are available at OEM field offices.

Develops Wood-and-Rubber Heel

Development of a new type rubber heel with a wood core, the use of which makes possible an estimated saving of 10,000,000 pounds of rubber and 1,700,000 pounds of steel yearly, has been announced by the B. F. Goodrich Co., Akron. The new construction conserves approximately 1¼ ounces of compounded rubber and 1/5th of an ounce of steel on each pair of half heels of the standard one-half inch size. The wood used in the cores of the new heel, already in mass production, is a good grade of maple, supplies of which are plentiful. The heel can be made on standard rubber heel manufacturing machinery and can be applied to shoes with no change necessary on equipment now in use in shoe factories. The saving in steel results from the elimination of the steel washer inserts used on conventional heels. The accompanying photograph shows both the new and conventional heels.

U. S. Rubber has introduced "PIB," liquid insulation for auto wiring. One treatment will last more than six months, according to the company, during which time it will eliminate battery post and cable corrosion, waterproof the ignition system, and restore and protect the life of wiring. Conservation of vital ignition parts and battery cables is claimed. The company has also introduced a sturdy, simple and economical applicator tool for introducing its Automotive Static Neutralizer Powder into inner tubes. The powder eliminates static charges.

A new type of opaque glass that floats like cork and can be used as the bouyant element in the construction of life boats, life rafts, life preservers, and pontoon bridge supports has been developed by the Pittsburgh Corning Corp., Pittsburgh, Penna. The new product, called Foamglas, can be used as an alternate material for cellular rubber, cork, balsa wood and kapok.

LOS ANGELES NEWS

Curtis R. Wolter, who has been purchasing agent for the Kirkhill Rubber Company for some time, has resigned his position. The work has been taken over by H. Carroll Walker, until recently a salesman for the company.

Howard Lein, who established the Atlas Sponge Rubber Company at 806 E. 61st Street a few years ago, and built it into one of the finest small plants of the kind on the coast, has leased the plant to the Kirkhill Rubber Company and has returned to Minnesota where he will look after his farming interests "for the duration" at least. The company now in charge is operating a double shift and has transferred much of the sponge rubber work of the entire organization in California to this plant.

The Los Angeles Standard Rubber Company at 1580 E. Slauson Avenue, has added considerable new equipment during the last month. Among items added are a T-50 machine, a Geer oven, a Scott tester, a boiler, a Span grinding machine, and an oxygen bomb. The company has also rearranged the offices by the addition of new partitions all done in knotty pine. The four proprietors—Charley Kuhn, Carl Phipps, Bob Wade and Franklin Sturdivant — are kept especially busy with the large increase in business. Practically all work is defense work and practically all rubber used is synthetic.

George Steinbeck of H. M. Royal, Inc., and Charley Kuhn, Fred Woerner and Frank Sturdivant of the Los Angeles Standard Rubber Company, formed a group recently, the business of which was to lower the water levels of the Pacific Ocean by removing fish from its depths. The expedition achieved its purpose in one day's time as 63 barracuda, each representing an enormous water displacement, were removed almost without effort from the well known waters near Newport Beach.

Billy Stone, son of Marvin Stone of the Mihm Rubber Company, who has been in training in the Coast Artillery Service, is now in Hawaii after having been stationed at San Diego for some time.

Henry H. Vickrey, formerly secretary of the West American Rubber Company, who went into the United States Army about eight months ago (before Pearl Harbor) as a major has now been promoted to the rank of lieutenant-colonel. He is located at Boulder Dam. The West American Rubber Company is now practically 100 per cent in defense work and is keeping very busy.

Mrs. Charles Lamb, Sr., who has been a patient in the Huntington Memorial Hospital, Pasadena, for a month, at this writing is much improved and her husband was expecting to have her return home within a few weeks. (Mr. Lamb is general manager of the West American Rubber Company.)

The Kirkhill Rubber Company has established a new laboratory in the main plant at Slauson Avenue and Hoover Boulevard. Richard Banta, formerly with the Brown Rubber Company in Indiana, is one of the chemists who recently has joined the staff in this laboratory. With him is Milton Stotz who has been in the employ of the company for some time.

Ed Royal, local manager for H. M. Royal, Inc., has two sons doing their part with the armed forces of the United States. One of them who enlisted the day after Pearl Harbor is now some place in Asia.

On July 7, the day of this writing, only a few reservations were unclaimed for the Uplifters' Club Party which was to be held at that club by the Los Angeles Rubber Group, on Friday evening and all day Saturday, July 24 and 25. It was expected that the lists would be complete with all reservations taken long before the dates set.

Added to the entertainment as previously planned was a breakfast program stunt by Judge LeRoy Dawson of Los Angeles, a man who has achieved more than city-wide fame as a humorist and radio entertainer. Judge Dawson was scheduled to conduct a "trial."

Thirty-five different prizes, all valuable, were being offered. Sports events were to include soft ball, Badminton, golf, horse shoes, tennis, ping pong, and egg throwing.

A barbecue supper and a fine breakfast were scheduled as top features of the eating phases of the program. Active in making the event a success were Ed Royal of H. M. Royal, Inc.; L. F. MacDonald, formerly of Goodrich; and C. J. Roese of Goodyear. Prizes came from a large number of sources.

This event was to be staged in place of the annual fishing trip which was called off because of war conditions.

Carl E. Stentz, who has been active in most rubber doings in the Los Angeles area for many years and who recently has been plant superintendent for the Sierra Rubber Company, has resigned that position to take a job as director of research for the Avery Adhesive Company, 453 E. Third Street. Mr. Stentz was scheduled to leave for New York, Washington, and other points in the east on July 15. He planned to be absent from Los Angeles for about a month. Mr. Stentz's father is now managing the Latex Seamless Products Company which Mr. Stentz established a few years ago at 4620 E. Washington Boulevard. This company is taking care of a number of defense jobs.

W. S. Harmon, Firestone Tire and Rubber Company engineer, was in Los Angeles in July in connection with the job of coordinating construction work in proposed synthetic rubber plants to be built and operated by several companies for the government. A tract of 280 acres of land has been selected. The plants, which will be built near each other on this tract, will cost about $30,000,000. Included in the project will be the Dow Chemical Company producing styrene and the Shell Oil Company and Southern California Gas Company producing butadiene, Mr. Marmon reports. While the total tonnage to be produced is a secret it is admitted that more rubber will be produced than is used now on the Pacific Coast.

Mr. Harmon pointed out to newspapermen that these industries are industries that will stay after the war. It was pointed out also that by locating the plants in the Los Angeles area near sources of supply tank car shipments can be eliminated.

The Defense Plant Corporation is to have charge of financing construction of the plants which according to present schedules should be operating by March 1 of next year. A 24-hour per day program on construction is now planned.

The employment of more and more women in the rubber plants in Los Angeles and surrounding area was emphasized this month. The Goodyear Tire and Rubber Company reports a considerable increase in the number of women employees.

Goodrich Announces Tubeless Tire

Invention of a revolutionary heavy-vehicle tubeless tire has been announced by the B. F. Goodrich Co. Use of a specially-designed locking member which retains the air in the casing is said to be the secret of the new development, of primary importance at this time because of the savings it makes possible in rubber ordinarily used for inner tubes and flaps. The new device can be mounted in a tire with ease, according to Goodrich, in a procedure which is simple to learn and requires no special tools. While the amount of rubber saved depends on the size of the tire, it is estimated that at a minimum the saving will be approximately 7% of the rubber content of the conventional casing, tube and flap ensemble.

CANADIAN NEWS

R. C. Berkinshaw, who went to Ottawa on loan from his position as treasurer and general manager of the Goodyear Tire and Rubber Company of Canada, Ltd., has been promoted to the rank of Assistant Deputy Minister of the Department of Munitions and Supply. In his new post, Mr. Berkinshaw will be in charge of all industrial controls. He will retain his place as Chairman of the Wartime Industries Control Board but relinquishes his duties as Director General of the Priorities Branch to W. E. Uren, former Deputy Priorities Officer.

One of the most recent orders issued by Alan H. Williamson, Controller of Supplies, limits for the first time the purchase of retreaded tires, used tires and tubes, and retreading services. Existing controls over new tires and tubes have also been made more stringent by setting up three classes of eligible tire buyers on a sliding scale gauged according to the usefulness of the vehicle to the Dominion's war effort. All other motorists have been ruled ineligible to buy any usable tire or retreading service.

The new order rescinds all previous tire orders and provides a strict priority basis for all dealings in usable tires and tubes. It is believed that the new order will make it illegal for approximately one million Canadian motorists to buy usable tires or retreading service.

The regulation which made it a criminal offense to burn, cut or otherwise destroy any tire or tube (*cf.* RUBBER AGE, February, 1942) has been broadened to include all scrap rubber.

The order now provides that no person shall burn, cut or destroy any tire or tube of a passenger car, truck, motorcycle, bicycle, airplane or other vehicle, any rubber boot, hose, scrap from repairing or from making repair materials, buffing scrap from retread operations, fan belts, radiator hose or other used or discarded rubber products or rubber scrap. Infractions of the law are punishable by fines up to $5,000 or five years imprisonment or both.

Names of several Canadian rubber men are included in the list of recently elected division and branch officers of the Canadian Manufacturer's Association. The Hamilton-Brantford branch has named W. H. Funston, Firestone, to the executive committee; T. M. Mayberry, also of Firestone, to the membership committee; and R. V. Woffindin, of A. G. Spalding, to the entertainment committee. N. A. Austin, Miner Rubber, has been elected to the executive committee of the Quebec Division. John Miner and John C. Bouskill, both of Miner Rubber, have been named vice-chairman and secretary, respectively, of the Granby branch. W. H. Hodgson, of the Hodgson Rubber Company, has been elected to the executive committee of the Moose Jaw, Saskatchewan, branch.

Progress made in redeeming two bond issues indicates that the B. F. Goodrich Rubber Company of Canada, Ltd., will soon be completely out of debt. The two issues were inherited from the company's predecessors, the Ames Holden Tire and Rubber Company and the Canadian Goodrich Company.

The seven per cent first mortgage bond issue, due January 1, 1943, had been reduced to $27,500 at the start of this year. Redemption of seven per cent cumulative income second mortgage bonds of the old Ames Holden Company has reduced the total outstanding from $1,048,600 in 1940 to $37,673 in May of this year. In March, in addition to paying the regular three and one-half per cent semi-annual interest on the income bond issue, a total of sixty-two and one quarter per cent was paid on arrears of interest, eliminating all accumulations. As a result of this payment, excepting for the small remainder of the two bond issues, there is left only the common stock, of which 85,885 shares are outstanding, practically all held by the parent company.

Viceroy Manufacturing Company, Toronto, manufacturers of miscellaneous mechanical rubber goods, reported total earnings of $479,287 for the year ending Feb. 28, 1942 as compared with $250,-182 for the previous year. Net profit of $80,368 compared with $72,689 in 1941 and was equivalent to $5.90 a share on the preference stock. Current assets of $872,478 are reported against current liabilities of $369,122, leaving a working capital of $503,356. The company redeemed 800 preference shares last year, which leaves only 13,600 outstanding.

Imports of crude rubber into Canada in April, 1942, amounted to 17,023,133 pounds compared with 5,669,217 for the same month in 1941. Although imports for the first two months of the year were very low, a good month in March followed by high imports in April have brought the total imported for the first four months of the year up to 38,523,612 compared with 36,901,434 for 1941, an increase of 4.4 per cent.

The names of six men prominent in the Canadian rubber industry were mentioned in the House of Commons recently when a report was made to that body about the men who have been loaned to the Department of Munitions and Supply for the duration of the war.

The six men, their peacetime connections, and their present jobs are: R. C. Berkinshaw, Toronto, treasurer and general manager of the Goodyear Tire and Rubber Company of Canada, assistant deputy minister in charge of industrial controls; E. T. Griffith, Stratford, president of G. L. Griffith and Sons, adviser to the Controller of Supplies; J. A. Martin, Kitchener, vice-president of Dominion Rubber Company, adviser to the rubber controller; Ira G. Needles, Kitchener, tire sales manager of the B. F. Goodrich Rubber Company of Canada, consultant on rubber control; S. G. Nicholls, Toronto, Goodyear, staff of rubber controller; and W. J. Worden, Farnham, Quebec, manager of the St. Lawrence Rubber Company, staff of rubber controller.

Lee Named Special Adviser

George A. Lee

Recently announced in Ottawa was the appointment of George A. Lee to be special adviser to A. H. Williamson, Controller of Supplies, in connection with synthetic rubber problems.

Mr. Lee, a native of Toronto, was graduated in chemical engineering from the University of Toronto in 1932. After a short time in the paint business he joined the Canadian Industries, Ltd., organization in 1933 and has been selling rubber chemicals and neoprene ever since. Mr. Lee was in charge of the Toronto office until 1940 when he was transferred to Montreal to become assistant sales manager of C.I.L.'s organic chemicals division.

In the future, instead of sending requests for allocations of the various synthetic rubbers directly to the War Production Board in Washington, Canadian rubber manufacturers will send them to Mr. Lee's office in Ottawa, where they will be collected and analyzed before being sent to Washington.

This method of handling allocations of synthetic rubber will save considerable time for Canadian rubber manufacturers.

OBITUARIES

Charles E. Wood

Charles Elgar Wood, president of Charles E. Wood, Inc., crude rubber brokers of New York, died at the age of 66 on June 10. Mr. Wood was born in October, 1876, at Piermont, N. Y. He received his education in the public schools and finished at Trinity School. His first job was with the New York Commercial Co., with which he was connected for 19 years, serving as cashier and finally as a salesman, remaining with the firm until its liquidation.

On March 17, 1913, Mr. Wood began business as a broker in crude rubber, balata, gutta-percha and other rubbers, incorporating his business as Charles E. Wood, Inc., in 1922, and assuming the post of president which he held until his death. He was widely known as a specialist in Brazilian rubber as well as Far Eastern grades.

Mr. Wood was a member of the Commodity Exchange, Inc., the Rubber Trade Association of New York, and an associate member of the Rubber Manufacturers Association. He was also a member of Wawayanda Lodge No. 315, F. & A. M., Rockland Chapter No. 204, Royal Arch Masons, Columbian Commandery No. 1, Knights Templar, and Mecca Temple Ancient Arabic Order of the Nobles of the Mystic Shrine.

Funeral services were held in Montclair N. J., on June 12, with interment in Mt. Hebron Cemetery, Upper Montclair, on June 13. He leaves a widow, a daughter, and two sons, William G. and Richard H., the latter secretary of Charles E. Wood, Inc.

Ralph Blando

Ralph Blando, vice-president of the Velveton Rubber Heel Corp., Laurel Hill, L. I., N. Y., widely known in the heel and sole business throughout the country, died at the Boulevard Hospital in Long Island City at the age of 59 on May 16. Born in Buenos Aires, Argentina, on December 23, 1882, Mr. Blando received his education in that country. During his early youth he traveled extensively in Europe and South America. In 1920 he helped organize the P. & B. Rubber Manufacturing Co., Inc., of Laurel Hill, and acted as its treasurer and sales manager until the firm was liquidated two or three years ago. For a short while he was connected with the Marbland Corp., an import and export firm, and in 1940 organized the Velveton Rubber Heel Corp. Mr. Blando, among other social and civic connections, was a member of the Queens Chamber of Commerce. He leaves a widow, two daughters, and a son, Charles F. Blando, associated with the Velveton concern.

John C. Woodward

John C. Woodward, representative of A. Schrader's Son in the Ohio and West Virginia area on jobber sales for the past seven years, died at the age of 50 at City Hospital, Akron, after an illness of two months.

A native of Sharon Center, Ohio, he attended Sharon Center and Akron Central high schools and studied at Akron University at night. He was employed at the old Miller Rubber Co. for 19 years in the laboratory and as head of the purchasing department of the Falls Rubber Co. for two years. During the last war he served as a sergeant and was in France.

Mr. Woodward was a prominent member of West Congregational Church in Akron and had been superintendent of both junior and senior departments of the Sunday School. He was a member of Adoniram Lodge, F. & A. M., Akron Council, Washington Chapter, and Yusef Khan Grotto. He leaves a widow and two daughters.

Sherman B. Ward

Sherman Broomhead Ward, president of Stowe-Woodward, Inc., Newton Upper Falls, Mass., died on July 3 at the age of 52 after a long illness. He joined the rubber company in 1916 as treasurer and was elected president in June, 1932.

Mr. Ward was born on January 30, 1890, at Portsmouth, N. H. He attended Phillips Exeter Academy and was graduated from Dartmouth in 1913. His social, business and fraternal contacts included memberships in the Woodland Golf Club, Engineers Club of Boston, Brae Burn Country Club, Dartmouth Club of New York, and the Masonic organizations. He was widely traveled and included the taking of colored motion pictures among his hobbies.

Funeral services were held at Waterman Chapel in Boston on July 5, with interment at Wilton, N. H., near his country home, on the same day. He leaves a widow and a brother.

Stanley A. Johnson

Stanley A. Johnson, manager of the sales-service department of the Cincinnati Rubber Mfg. Co., Cincinnati, Ohio, died at the age of 59 as the result of a heart attack on June 18 in Cincinnati. Mr. Johnson was just entering his automobile to drive to work when he collapsed. A native of Cincinnati, he had been associated with Cincinnati Rubber for thirty-two years. Two children survive.

E. S. Finch

E. S. Finch, credit manager of the Binney & Smith Co., New York City, from 1917 until his retirement in 1939 due to ill health, recently died at his home in Rutherford, N. J. He was widely known in rubber manufacturing circles. Mr. Finch was born in Brooklyn, N. Y., on March 12, 1881. He joined Binney & Smith, then located at 81 Fulton St., New York City, on July 15, 1906, as an order clerk. He was appointed credit manager in 1917 and charged with the responsibility of setting up a credit department. In 1930 he was made assistant secretary of the company. Mr. Finch was an active member of the New York Credit Men's Association, the National Association of Credit Men, and a trustee of the Stationers and Publishers Board of Trade. He was also a member of the Uptown Club of New York. A widow and daughter survive.

To Operate Ordnance Plant

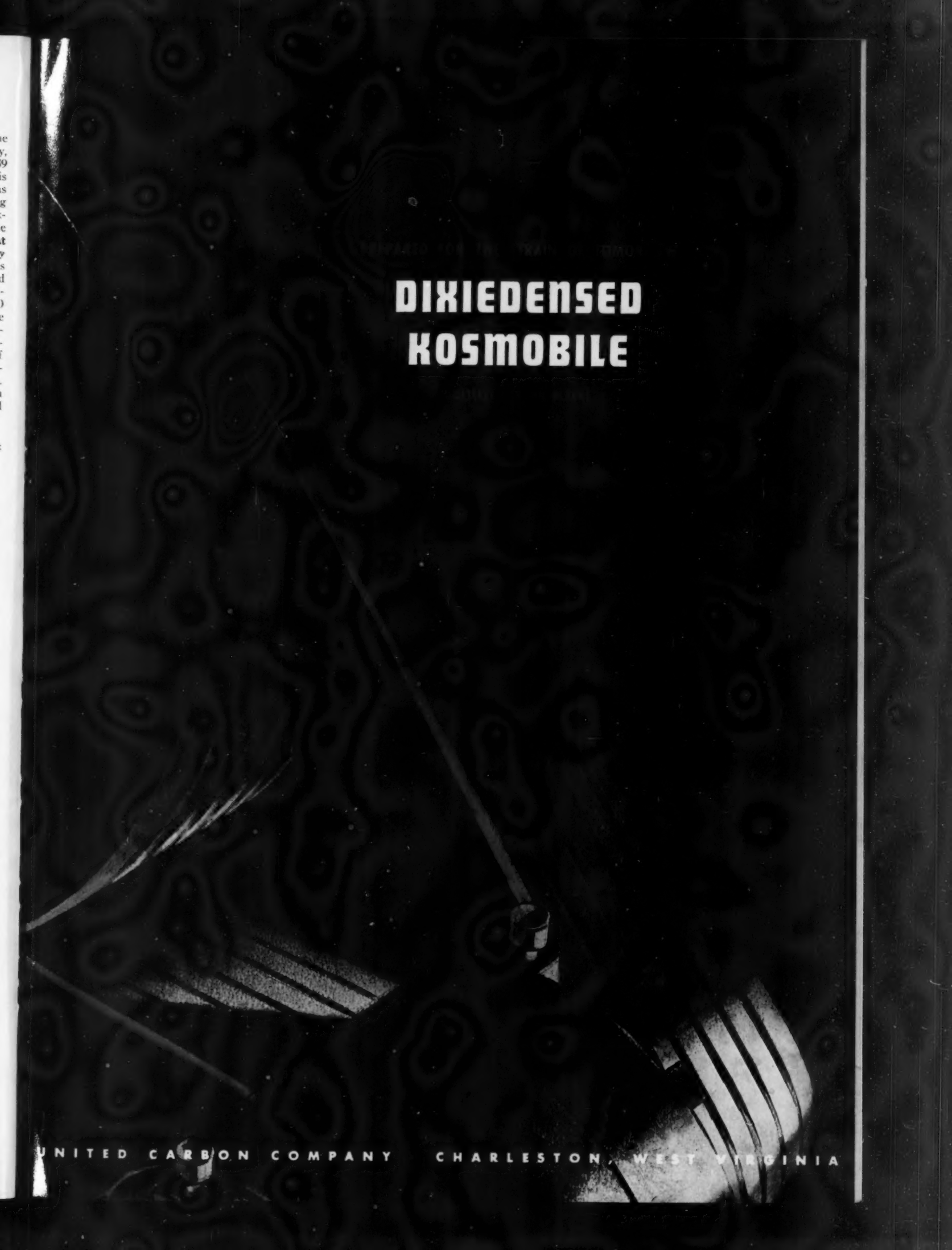
U. S. Rubber Co. has received a contract from the War Department to operate a new ordnance plant near Marion, Ohio. This is the third arsenal which the government in the last year has requested the company to operate, the others being located in Iowa and North Carolina. E. G. Brown, former production manager of U. S. Rubber's mechanical goods, general products and rubber thread divisions, has been named general manager of the new ordnance plant. J. M. Livermore is resident engineer.

Fellowship on Chemical Containers

The Pittsburgh-Des Moines Steel Co. has established a multiple fellowship on chemical containers and storage at Mellon Institute, Pittsburgh. Dr. James Bert Garner is senior incumbent and is aided by Ludwig Adams and R. M. Stuchell. According to an announcement from the steel company, of particular urgency at present is the work of the fellowship staff on storage in the synthetic rubber industry, including the basic chemicals—butadiene, styrene, acrylonitrile, and isobutylene.

Thinner Tire Cord Developed

A thinner tire cord, designed to save several pounds of rubber per tire, has been developed by the Bibb Mfg. Co., Macon, Ga. The new cord, which is said to have the strength of thicker cord but to be far more flexible, is made possible by bonding the cotton fibers in the process of manufacture. Tests over a period of 72 hours at 260° F. indicated that the strength of the new cotton cord was substantially equal to the original dry strength of the cord. Test results were taken every 12 hours.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USMC Lining Trimming Machine
Model B

USMC Lining Trimming Machine

Model B

THE USMC Lining Trimming Machine—Model B, is especially designed for trimming the surplus lining of Rubber Boots, Pacs, Lumbermen's Boots and Gaiters.

This machine not only insures uniform trimming, but does the work more economically than any other method.

It has an individual motor drive and is portably mounted allowing the work to be handled efficiently.

A number of these machines are being used in various Rubber Footwear Factories with excellent results.

Machines are sold outright.

Write to the nearest branch for prices and further particulars.

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Lynn, Mass.....525 Union
Milwaukee, Wis.....922 North Fourth
Nashville, Tenn.....901 Church St.
New York, N. Y.....110 Fifth Avenue
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It's not a substitute for the now unobtainable Italian pumice but is chemically and physically equal in every respect. Note its comparison.

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Silica	72.90	73.24
Alumina	11.28	10.61
Iron Oxide	.86	1.57
Titanium Oxide	.06	.10
Calcium Oxide	.80	1.10
Magnesium Oxide	.36	.40
Soda	3.64	3.03
Potash	4.38	5.58
Sulphuric Anhydride	.03	.05
Loss on ignition	5.20	4.04

Valencia is a true pumice stone and not a volcanic ash.
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These resins are neutral, waterproof resistant to chemicals, and soluble in low-priced solvents. Pale or dark colors in 5-160° C melting points.

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"R" RESINS
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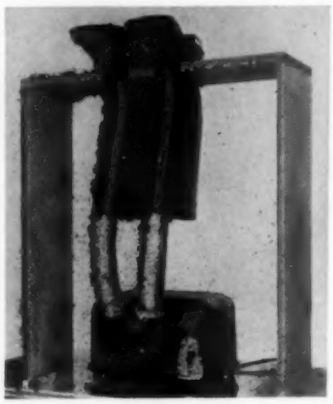
A-3

NEW EQUIPMENT

Electrical Dryer for Rubber Products

An electrical dryer for rubber boots, goggles, gas masks and all other safety appliances has been developed by the Chicago Hardware Foundry Co., North Chicago, Ill., under the name of the Sani-Dri Industrial Dryer. The dryer comes equipped with a special interchangeable nozzle for rubber boots. With the



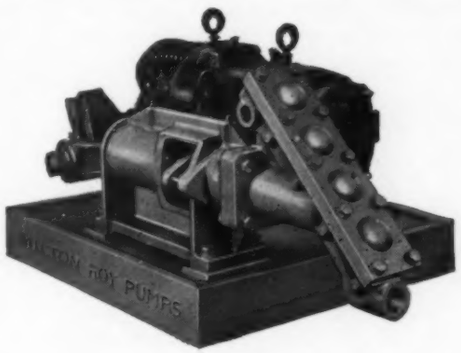
double nozzle seen in the accompanying illustration a strong current of electrically-heated air is blown into the boots and the drying of each pair is accomplished in from 3 to 5 minutes. For gas masks, respirators, goggles, etc., the boot tubes may be quickly removed and the equipment to be dried laid under the nozzle until drying is completed. The strong current of heated air is carried into every crevice, assuring a quick, complete and sanitary job of drying. The company stresses the point that where safety equipment is used by more than one shift of workers, the amount of equipment necessary is reduced by 50% due to the fact that it can be washed and dried between shifts. Without the dryer, it is necessary to allow several hours time to dry out rubber boots before they can be worn again. The blower and electric heating element are enclosed in a rectangular housing that mounts on a bench or table. The circuit switch is at the front of the housing and at the rear there is a length of extension cord and plug for connection to a power source.

Dean Angle Drive

A new type of angle drive for changing the direction of one or more shafts through a 90-degree angle in either a vertical or horizontal position has been developed by Payne Dean, Peekskill, N. Y. Designed for constant and intermittent duty either by hand or power operation, the new drive has a gear ratio of 1:1. It is adapted to speeds from 50 to 750 r.p.m., but may be modified for speeds up to 1,200 r.p.m. It has a rating of 5 h.p. at 750 r.p.m. The unit consists of a cast iron casing in which is mounted a pair of steel mitre gears immersed in common transmission grease and made oil-tight with grease retainers on all shafts. Bearings are of self-lubricating bronze. The new angle drive is said to be suitable for outdoor operation and for dusty locations and will operate in any position.

Milton Roy Pumps for Latex Use

Included among the many pumps made by the Milton Roy Co., 1300 East Mermaid Ave., Philadelphia, Penna., for practically every chemical service, is a model which has found application in connection with



latex. This model, illustrated herewith, although of special design is actually a standard unit, the valve with its single coverplate, an exclusive feature, being a modification only of the typical valve used by the company. This type of cover permits quick opening and exposes the entire interior of the chamber. Therefore, it is advantageously used as a sanitary valve, an important point in handling latex compounds. All pumps made by the company feature the patented Step-Valve design with its several modifications to handle practically all chemicals, to pump against pressures up to 20,000 pounds per square inch, and to accurately control volumes pumped down to one quart per hour. The valve has a number of other advantages of particular value in pumping a wide variety of materials. It is self-cleaning and non-clogging; the location of the ball-checks immediately adjacent to the plunger eliminates the possibility of air-binding, and wire-drawing is reduced to a negligible factor. The special pump illustrated has a capacity of 300 g.p.h. and an operating pressure of 35 pounds per square inch. It has been furnished in both fractional h.p. and integral h.p. units for laboratory, pilot plant and full-scale manufacturing operations in pumping synthetic compounds.

Tag No. 42 Non-Indicating Controller

A new controller, to be known as the Tag No. 42 Non-Indicating Controller, has been placed on the market by the C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y. It is small in size, simple in construction, accurate in operation, and suited to the majority of automatic control applications.

The smallest change of temperature at the bulb is transmitted positively and with precision to the ball air valve through the novel transmitting spring lever that multiplies the movement of the capsular spring. The air valve, in turn, resets the rate of flow through the diaphragm-actuated control valve in the steam line. In the new instrument the sensitiveness is high, the accuracy is permanent and the durability of the assembly has been proved by 24 years of service records.

LONGER LIFE FOR RUBBER GOODS

One of the sure ways to conserve rubber is to make rubber articles last longer. Toward this end the makers of Johnson's Wax have formulated a group of special wax finishes for rubber goods.

These finishes protect rubber articles with a non-porous wax film that retards deterioration by preventing oxidation.

Johnson's Wax Finishes have already been used with great success on auto parts, vacuum cleaner parts, stair treads, rubber-covered wire, toys and many other products. In addition to preventing or retarding oxidation, the finishes also contribute a natural, long-lasting high lustre.

Because of great coverage (approximately 2,000 feet per gallon, or higher), Johnson's Wax Finishes are extremely economical to use. May be applied by dipping, spraying or wiping onto surface. Available in 5 and 55 gallon drums, and in 1 gallon cans.

Samples and further information will be furnished on request.

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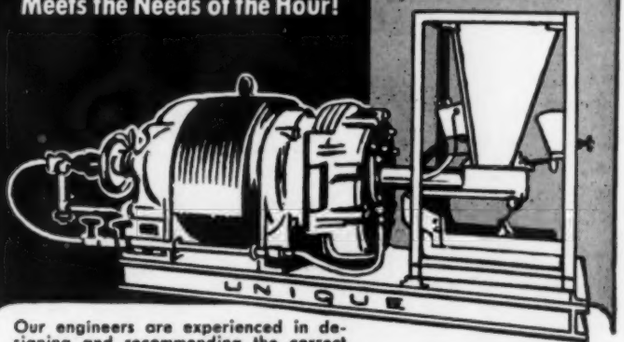

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Designed for gauging stock as it is coming from the calender.

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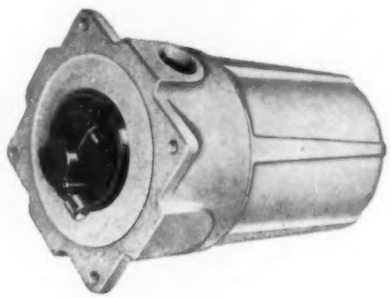
Cramer Explosion-Proof Timers

To meet the many present day demands for explosion-proof timers suitable for operations in atmospheres containing gasoline, naphtha, petroleum, benzol, acetone, lacquer, solvent, natural gas, etc., the R. W. Cramer Co , Inc., Centerbrook, Conn., has placed a line of timers to meet such specifications on the market. The accompanying illustration shows a Type TD1C



explosion-proof time delay relay which is laid out for panel board mounting with the setting knob and dial projecting. Within this housing it is feasible to mount either a TD1C or TD1 with a small relay. The latter construction would be used where it is desired to control the timer from remote located momentary start button.

Votator Method of Heat Transfer

Wider markets are being sought by the Votator Division of the Girdler Corp., Louisville, Kentucky, for what is described as a highly efficient, continuous, closed type of heat transfer mechanism for liquids and viscous materials. The unit—known as the Votator—has been employed heretofore as an integral part of complete processing equipment manufactured by the company for a special group of industries. The unit also offers mixing, emulsifying or aerating simultaneous with heating or cooling. Outstanding features of the Votator include the following: heats or cools in seconds by a patented principle of passing a very thin film of product over a relatively large heat transfer surface; continuous rapid flow of product through unit; uniform temperature, accurately controlled; a completely enclosed system; simplicity of design; and more economy due to increased speed and efficiency of heat transfer, use of less heat transfer medium, and facilities for simultaneous mixing. A Votator unit is now being used in one of the synthetic rubber plants but censorship prevents a specific description of its use at present.

The Standard Oil Co. of Indiana, Chicago, Ill., has developed a **tire mileage gauge** which estimates the average mileage remaining in a tire by the depth of its anti-skid tread. The gauge makes various estimates of tire mileage, ranging from 6,720 to 53,200 miles, for a tire which is driven up to 40 m.p.h., receives proper care, and is not recapped, regrooved or retreaded.

REVIEWS

BOOKS

The Progress of Science: 1942. Edited by S. Edgar Farquhar. Published by the Grolier Society, 2 West 45th St., New York, N. Y. 6½ x 9½ in. 404 pp. $2.95.

This is the second volume in a series tracing the progress of science over a twelve month period, the current edition presenting a review of the fast-moving events during 1941. Coverages are given on each broad field, from Aeronautics to Zoology, with many subdivisions of the larger topics and with other short special articles. The reviews are written by authorities in each field, that on rubber having been prepared by James W. Schade, former director of research of Goodrich who recently retired, and that on plastics by Gordon M. Kline, of the National Bureau of Standards.

In addition to reviews of progress in specific fields, this science yearbook includes a large number of biographical sketches of distinguished scientists who died during the year under review and of living men and women of the laboratory who are in the forefront of progress. Portraits of many of these scientists are reproduced. At the end of most of the major reviews the writers have included bibliographies referring the reader to important 1941 publications, thus enabling him to pursue further subjects of particular interest. A topical analysis at the end of the book gives copious cross references and includes the complete list of biographies and the titles of all reviews.

•

South American Handbook: 1942. Published by Trade & Travel Publications, Ltd., London, England. Available from H. W. Wilson Co., 950 University Ave., New York, N. Y. 4½ x 7 in. 676 pp. $1.00.

This is the nineteenth annual edition of the *South American Handbook* and the third produced since the war began. The pages of the book are again replete with facts, figures, charts, and maps, including a 15 x 20-inch folded-in map in colors. Actually the scope of the book is broader than the title suggests, since Mexico, Central America and a number of islands in the West Indies are included. Data on each specific country is given, including such information as chief cities, pleasure resorts, physical features, climate, resources, industrial development, and currency, weights and measures.

BOOKLETS, CATALOGS, Etc.

Compounding and Processing of Neoprene Type GN. (Report No. 42-2). By N. L. Catton, D. F. Fraser and D. B. Forman. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9¼ in. 40 pp.

This report revises and brings up to date the company's previous report (No. 40-2) on the compounding and processing of Neoprene Type GN, considered as the all-purpose neoprene because of its adaptability to a wide variety of applications. The use of modifying agents, curing agents, accelerators, antioxidants, retarders, softeners and fillers is discussed in the section devoted to compounding, while the subjects of plasticizing, mixing, calendering, extruding, spreading, molding and vulcanizing are discussed in that devoted to processing. Numerous tables showing the effect of various compounding ingredients in Neoprene Type GN stocks are included.

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REVIEWS (CONT'D)

Rubber. Smith, Barney & Co., 14 Wall St., New York, N. Y. 6 x 9 in. 24 pp.

This is an excellent survey of the current status of the rubber industry. It reviews consumption of rubber in recent years, discusses future requirements (based on Leon Henderson's recent figures), outlines stocks on hand and sources of supply, and explains the projected synthetic rubber program. In summing up the outlook for the rubber industry, the conclusion is drawn that "despite the acute rubber shortage as far as the man in the street is concerned, the rubber industry is going to be fairly busy, apart from such armament orders as aeroplane assembly or machine gun manufacture." The point is made that as is usual under abnormal economic conditions "certain companies are going to fare better than others, and some are going to be badly hit." An encouraging prediction is made to the effect that "the post war rubber industry will handle a volume of business never achieved in prewar years."

•

Neoprene Type FR. (Report No. 42-1). By D. F. Fraser. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9¼ in. 20 pp.

This report describes Neoprene Type FR—the new freeze-resistant type of neoprene, the vulcanizates of which, in addition to comparing favorably with the best rubber stocks in freeze resistance, also exhibit high resilience, low compression set, and excellent water resistance. The compounding of this new type neoprene is fully discussed, with data given on the effect of sulfur and fillers on its properties. Tables showing the comparison of Neoprene Type FR with other types of neoprene and with rubber are included. A new test method developed by the company for evaluating the performance of vulcanized rubber and synthetic rubber at low temperatures is described.

•

Modern Laboratory Appliances (No. 90). Published by Fisher Scientific Co., 711 Forbes St., Pittsburgh, Penna., and Eimer and Amend, 633 Greenwich St., New York, N. Y. 7½ x 10½ in. 966 pp.

This new book, which is more aptly termed a reference book than a catalog, has been published as the combined listing of laboratory supplies in the Pittsburgh stocks of the Fisher Scientific Co. and the New York stocks of Eimer and Amend. It lists almost 11,000 different items used in chemical, metallurgical and biological laboratories, and illustrates more than 4,000 of them. Hundreds of these items are used in the rubber laboratory. A comprehensive alphabetical index lists all items under every classification that suggests itself and makes the location of any apparatus a simple matter.

•

Metco Metallizing Equipment. (Bulletin No. 42-A). Metallizing Engineering Co., Inc., 21-07 41st Ave., Long Island City, N. Y. 8½ x 11 in. 16 pp.

This bulletin describes the metallizing process and equipment for its application. It also tells briefly how essential industries are eliminating replacements and increasing service-life of equipment now difficult to replace by building up worn diameters. Examples are given to show how metallized "inserts" and coatings are helping manufacturers conserve vital metals.

AIR BAG BUFFING MACHINERY
STOCK SHELLS HOSE POLES
MANDRELS
NATIONAL SHERARDIZING & MACHINE CO.
868 Windsor St. Hartford, Conn.
Representatives: Akron San Francisco New York

Guayule. General Tire & Rubber Co., Akron, Ohio. 5½ x 8½ in. 16 pp.

The story of guayule to date is very well told in this little booklet. The history of the plant since its discovery in Mexico some 50 years ago is given, with information on how and where guayule grows and how it yields its rubber. The resin problem is reviewed as is the economics of cultivation and use. Both the McCallum 5-year cycle plan and the Spence plan for broadcast sowing are discussed. The claim is made that for tire use guayule is superior to present-day synthetic rubbers.

•

Processing Machinery for Reclaiming Rubber. (Catalog No. 37-A). Robinson Manufacturing Co., Muncy, Penna. 8½ x 11 in. 8 pp.

The varied line of equipment suitable for the reclaiming of rubber made by the company is described and illustrated in this catalog. Included is data on crushers, cutters, hammer mills, grinders, attrition mills, and sifters. Some of this equipment was specifically designed for the reclaim process. Information on the company's conveying equipment, used in handling materials from the original to finished product, is also given.

•

Industrial Rubber Products Conservation. Goodyear Tire & Rubber Co., Akron, Ohio. 8½ x 11 in. 38 pp.

This is a manual devoted to the conservation of mechanical installations which contain rubber, such as transmission and conveyor belts, hose, V-belts, and similar items. By means of text and pictures the right and wrong way to install mechanical rubber goods are stressed. What troubles to expect and how to correct them are covered. A table of fitting recommendations for hose is included. The theme that proper conservation of industrial rubber goods starts with installation is stressed throughout the manual.

•

Helping Industry Help America. Sun Oil Co., 1608 Walnut St., Philadelphia, Penna. 8½ x 11 in. 16 pp.

This booklet consists of a number of actual case histories of how engineering service in applying petroleum products in rubber, metal working, general lubrication, processing, mining, textile manufacturing and other operations is helping American industry produce more. The specific operation involved, the problem encountered, how it was overcome, and the petroleum product recommended to solve the problem are given in each case. The booklet is tabbed for easy filing and reference.

•

Piccocizer 30. Standard Chemical Co., Akron Savings & Loan Building, Akron, Ohio. 8½ x 11 in. 8 pp.

The special advantages of Piccocizer 30, described as an all-purpose plasticizer for synthetics, are stressed in this bulletin. These advantages are said to include low-temperature flexibility, less incorporating time, low cost and unlimited availability. The productive possibilities and potential economics of the application of Piccocizer 30 to compounding needs are summarized.

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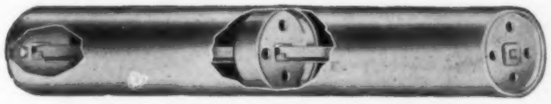

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RATES: Five cents per word, minimum charge, $2.00, except POSITIONS WANTED, $1.00 for 40 words or less, extra three cents per word. All classified advertisements payable in advance. Address replies to box numbers care of RUBBER AGE, 250 West 57th St., New York.

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CHEMIST—with over 14 years' experience in rubber research and compounding, including development of synthetic rubbers and their processing and compounding. Have full knowledge of development and manufacture of tires, mechanicals, proofed goods, latex and latex sponge, dipped goods, etc. Age 38. Available immediately. Address Box 1230, RUBBER AGE.

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, JULY 11, 1942

Crude Rubber

THE Rubber Reserve Company is continuing its negotiations with Latin American countries looking toward assurances of crude rubber sources. In the past month, agreements have been concluded with Costa Rica, Colombia and Bolivia. Previous agreements were made with Brazil, Nicaragua and Peru. Like the earlier agreements, the new ones provide for the purchase by Rubber Reserve of all exportable crude rubber from the respective countries over and above that needed by themselves.

As in the case of the agreements concluded with Brazil, Nicaragua and Peru, those with Costa Rica, Colombia and Bolivia provide for the exploitation of crude rubber sources with American funds. Colombia will receive a loan of $1,000,000 for this purpose and Bolivia one of $2,125,000. These funds are intended for scientific intensification of rubber production and improvement of health conditions in the rubber districts.

Encouraging reports regarding the Brazilian situation continue to emanate from that country. Brazil is believed the "white hope" of the crude rubber situation, although no definite estimates can yet be made of possible imports within the early future from that country. Approximately 40,000 tappers are said to be at work, with current plans calling for the equipping of another 20,000 before the end of this year.

Although experiments continue on the development of rubber-bearing plants in the United States, those conducted to date have convinced experts of the Bureau of Plant Industry of the Department of Agriculture that there is no quick, easy source to replace the quantities cut off by Japanese conquest of the Far East. These experts insist that guayule is the most promising plant of them all, despite the fact that substantial yields from guayule cannot be expected for several years to come.

Prices shown below are those set by the Rubber Reserve Company:

As of July 11

Fixed Government Prices

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.22½
No. 2	—	@	.22¼
No. 3	—	@	.22
No. 4	—	@	.21¾
Thin Latex Crepe	—	@	.23
Thick Latex Crepe	—	@	.23
Brown Crepe, No. 1	—	@	.21¾
Brown Crepe, No. 2	—	@	.21
Amber Crepe, No. 2	—	@	.21¾
Amber Crepe, No. 3	—	@	.21
Brown Crepe, Rolled	—	@	.17

Latex—

Normal, carload lots, tanks	—	@	.2595
Normal, carload lots, drums	—	@	.2825
Conc., carload lots, tanks	—	@	.2765
Conc., carload lots, drums	—	@	.2950

Guayule—

Ampar	—	@	.28

Paras—

Up-River, fine	—	@	—
Acre Bolivian, fine	—	@	—

Balata**—

Surinam Sheet	—	@	.55
Prime Manaos Block	—	@	.50
Peruvian Prime	—	@	.50
Venezuelan Block	—	@	.52

* Prices for import.

Scrap Rubber

The recently-concluded nation-wide scrap rubber drive has resulted in sufficient supplies to meet the demand for some time to come. In addition to the miscellaneous scrap accumulated as a result of the patriotic drive, higher prices for scrap has resulted in accelerated movement of supplies from normal trade sources. This is reported to be particularly true of tire stocks of all classifications. In view of the aforegoing, dealers anticipate little difficulty in the supply situation for the next several months. Prices shown below are ceilings on typical classifications taken from Revised Price Schedule No. 87, as Amended:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless passenger tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless truck tires	ton	24.00
No. 1 passenger peelings	ton	47.50
No. 1 truck peelings	ton	47.50
Gray carcass	ton	47.50
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06¾
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.05¼
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00
Black mechanical scrap, above 1.10	ton	20.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41

CHAFERS

Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	— @	7.818
40x40	36 in.	6.15	lb.	— @	6.991
40x36	36 in.	6.50	lb.	— @	6.615
48x48	40 in.	2.50	lb.	— @	16.200
48x48	40 in.	2.85	lb.	— @	14.210
56x60	40 in.	3.60	lb.	— @	11.944
48x44	40 in.	3.75	lb.	— @	11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

Moving in a 145 point range since our last report, the price of spot cotton on the Exchange passed the 20-cent level on June 29, a considerable gain above the price of 19.41 quoted on June 15. The June advance was largely due to trade buying and speculative interest. The disturbing tenor of war news, particularly from Egypt, also contributed to the strengthening of the market. Early this month Wall Street commission houses took the initiative in one of the broadest buying movements in some time, with the result that the price jumped to 20.36 on July 1, advancing to 20.57 the following day and to 20.71 on July 3. Presidential intervention in the House-Senate controversy over government sales of wheat brought a reaction in the cotton market, and the price dropped to 20.53 on July 6. The subsequent report that the President approves crop loans at full parity, however, again strengthened the market, the price advancing to 20.86, high for the period, on July 9. Interest of the trade currently centers on the disposition of the parity loan bill. Quotations for middling uplands on the exchange follow:

	June 13	July 11		
	Close	High	Low	Close
July	18.08	19.12	19.12	19.12
October	18.36	19.44	19.29	19.44
December	18.50	19.53	19.36	19.51

Reclaimed Rubber

Reclaimers report continued demand from all branches of the rubber industry, with demand from manufacturers of industrial rubber goods reaching especially high levels as the war program swings into full acceleration. As a result of the recently-concluded nation-wide scrap rubber drive, plus higher prices allowed for scrap in regular trade channels, reclaimers are now assured substantial stocks for some time to come. According to recent testimony by Jesse Jones, as head of the R.F.C., current reclaiming output has been stepped up to 26,000 tons monthly, an output which may reach 35,000 tons monthly in the near future as the result of improved processing methods. Prices shown below are ceilings:

Shoe

Unwashed	lb.	.07 @	.07¼

Tube

Black Tube	lb.	.11¼ @	.11½
Red Tube	lb.	.12 @	.12¼

Tires

Black (acid process)	lb.	.07½ @	.07¾
Black, selected tires	lb.	.06½ @	.06¾
Truck, Heavy Gravity	lb.	.08½ @	.08¾

Miscellaneous

Mechanical blends	lb.	.04½ @	.05½
White	lb.	.13 @	.13¼

Ducks

Enameling (single filling)	lb.	— @	.43¼
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¾
Double filling, A grade	lb.	— @	.20¾

CHEMICAL MARKETS

New York, July 11, 1942
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	.42
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.40 @	.45
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.45
El-Sixty	lb.	.40 @	.47
Ethyl Zimate	lb.	— @	1.13
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.40 @	.50
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.65
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	1.55 @	1.70
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Selenac	lb.	— @	1.98
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiurad	lb.	— @	1.55
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.57
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)			
Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.16 @	.27
Browns [b]			
Mapico	lb.	.11 @	—
Umber, Turkey	lb.	.04¾ @	.05½
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.09¾ @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¼ @	—
Whites [b]			
Cryptone No. 19	lb.	.0560 @	.0585
Cryptone CB No. 21	lb.	.0560 @	.0585
Cryptone ZS-800	lb.	.0825 @	.0850
Lithopone:			
Albalith	lb.	.04¼ @	.04½
Astrolith	lb.	.04¼ @	.04½
Azolith	lb.	.04¼ @	.04½
Ray-cal	lb.	.05½ @	.05¾
Rayox	lb.	.14½ @	.15¼
Titanox A	lb.	.14½ @	.14¾
Titanox B	lb.	.05¾ @	.06
Titanox C	lb.	.05½ @	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼ @	.07½
Anaconda, lead free	lb.	.07¼ @	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼ @	.07½
XX Red—4	lb.	.07¼ @	.07½
XX Red—72	lb.	.07¼ @	.07½
XX Red—103	lb.	.07¼ @	.07½
Kadox, black label—15	lb.	.07¼ @	.07½
Red label—17	lb.	.07¼ @	.07½
St. Joe, black label	lb.	.07¼ @	.07½
green label	lb.	.07¼ @	.07½
red label	lb.	.07¼ @	.07½
U. S. P.—7, bbls.	lb.	.10½ @	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½ @	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½ @	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.07¼ @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow		.0355 @	—
Certified		.0355 @	—
Certified Spheron		.0355 @	—
Channel "S"		.12 @	—
Continental		.0355 @	—
Disperso		.0355 @	—
Dixiedensed		.0355 @	—
Dixiedensed 66		.0355 @	—
Excello		.0355 @	—
Furnex		.03½ @	.06
Furnex Beads		.03½ @	.06
Gastex		.03½ @	.06
Kosmobile		.0355 @	—
Kosmobile 66		.0355 @	—
Kosmos-Dixie 20	lb.	.03½ @	.06
Micronex (Amarillo)		.0355 @	—
Micronex Beads (Amarillo)		.0355 @	—
Pelletex		.03½ @	.06
P-33		.0475 @	—
Shell Carbon (Del. Midwest)		.025 @	—
Supreme		.0355 @	—
Thermax		.0225 @	—
Thermax "S"		.0675 @	—
Wyex		.0355 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	@24.50
99½%-300	ton	—	@16.50
86-90%-300	ton	—	@13.50
Asbestine	ton	16.50	@20.00
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	25.35	@36.00
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	60.00	@67.50
Calcene	ton	37.50	@43.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white	ton	32.50	@45.00
Clay, Aerfloted, Suprex	ton	11.00	@23.50
Aerfloted Paragon	ton	10.00	@22.50
Crown (f.o.b. plant)	ton	11.00	@ —
Dixie	ton	—	@11.00
Langford	ton	—	@ 8.50
McNamee	ton	—	@10.00
Par	ton	—	@11.00
Witco	ton	10.00	@ —
Cotton Flock (Dark)	lb.	.10½ @	.13
Kalite No. 1	ton	—	@26.00
Kalite No. 3	ton	—	@36.00
Kalvan	ton	—	@100.00
Kalvan "S"	lb.	— @	.09½
Magnesium carbonate	lb.	.06¼ @	—
Mica	ton	35.00	@44.00
Mineralite	ton	—	@30.00
Pyrax A	ton	— @	7.50
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Rubberol	lb.	— @	.17½
Silene (calcium silicate)	lb.	.04 @	.045
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Columbia Filler	ton	9.00	@14.00
Witco	ton	6.00	@ —
Wood Flour (100 mesh)	ton	30.00	@32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00	@ —
Black Diamond	ton	25.00	@ —
Genasco, solid (factory)	ton	—	@ —
Hard Hydrocarbon	ton	25.00	@27.00
MilliMar	lb.	— @	.05½
Parmr, solid	ton	— @	—
Pioneer, MR, solid	ton	— @	—

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00 @	4.50
Rodo #10	lb.	5.00 @	5.50
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.34
Santomerse S	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22¾ @	.27¾
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.50 @	.59
Ty-Ply	gal.	6.75 @	8.00
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls. [a]	100 lb.	3.38 @	3.63
Nitric, 36 degrees	cwt.	5.00 @	—
Acids, Fatty			
Laurex	lb.	.14¾ @	.17¾
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.10 @	.11
Stearite	lb.	.10 @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	5.70
Soda Ash, 58%	cwt.	1.15 @	2.98
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.12 @	.12½
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, amber [b]	lb.	.03½ @	.04½
Pigmentaroil, tank cars	gal.	.20½ @	—
in drums	gal.	.29 @	.30
Pine, steam distilled	gal.	1.20 @	—
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½ @	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06 @	.06½
coal tar	ton	19.00	@22.00
hardwood	ton	16.00	@22.50
pine, 200 lb. gr. wt. bbl.		6.00 @	6.50
Pigmentar, tank cars	gal.	.20½ @	—
in drums	gal.	.29 @	.30
Retort Pine Tar, drums	gal.	.29 @	.30
Solvents			
Acetone, pure [a]	lb.	.07 @	.173
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.05
Carbon, bisulfide	lb.	.05 @	.08½
Carbon tetrachloride	gal.	.73 @	1.27
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.48 @	.50
Ethylene dichloride	lb.	.07½ @	.08½
Plastogen	lb.	.07¾ @	.08
Reogen (drums)	lb.	.11½ @	.12
Rub-Sol	gal.	.09½ @	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	gal.	.82 @	.86
dest. dist., drums	gal.	.60 @	.65
Waxes			
Beeswax, white [b]	lb.	.61 @	—
Carnauba, yellow [b]	lb.	.86 @	.88
Ceresin, white, dom.	lb.	.13½ @	.15
Montan, crude	lb.	.45 @	.46
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼ @	—
Refined, 123/125	lb.	.05¼ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95 @	2.05
Gel	lb.	.56 @	.58
Hipar	lb.	.64 @	.66
Powder	lb.	.48 @	.50
Resin	lb.	.48 @	.50
Resin D	lb.	.48 @	.50
White	lb.	1.23 @	1.33
Albasan	lb.	.69 @	.74
Antox	lb.	— @	.56
B-L-E	lb.	.48 @	.57
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone A, B, C, D, E	lb.	.52 @	.63
Oxynone	lb.	.77 @	.90
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.48 @	.57

EXTENDERS

Naftolen	lb.	.15 @	.25
Vanzak	gal.	.05 @	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Colite	gal.	.90 @	1.15
Dipex	lb.	.06 @	.08
Glycerized Liquid Lubricant	gal.	— @	1.35
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Mold Paste	lb.	.12 @	.18
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾ @	—
Black	lb.	.08½ @	.13
White	lb.	.09 @	.15
Brown	lb.	.10 @	.14
Neophax A	lb.	.16½ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08 @	.12
Sulfur Chloride, yellow (drs.)	lb.	.03 @	.08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.40 @	—
Commercial (bags)	cwt.	2.05 @	—
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

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The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials —

ACCELERATOR Z 51
- Good Aging Properties
- Free from Rapid Overcure
- Safe Processing Properties
- Low Dosages for Optimum Cures

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245 Fifth Ave. New York, N. Y.

ACCELERATORS—
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MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
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CONTINENTAL UNCOMPRESSED
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Compressed — Compact (Dustless)
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DIXIE...KOSMOS
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WITCO DISPERSO
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For All Cures
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STEAREX BEAD
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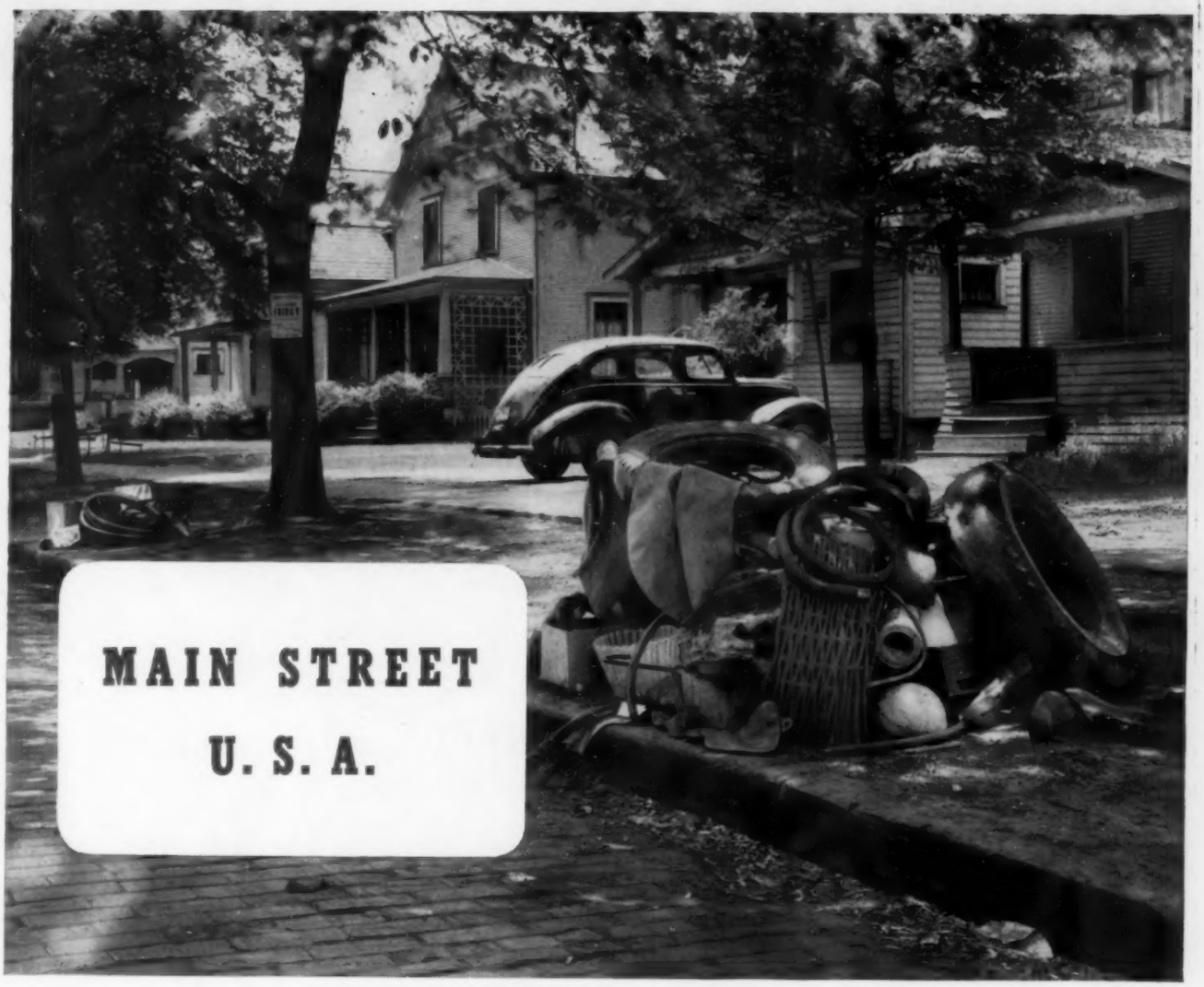

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